AUGUST 1961

PVP

PAINT and VARNISH PRODUCTION

Sapolin's E. A. Eckart, Jr., cites fast retailing of a compact line of ready-mixed colors as the key to profitable paint merchandising. See page 57.

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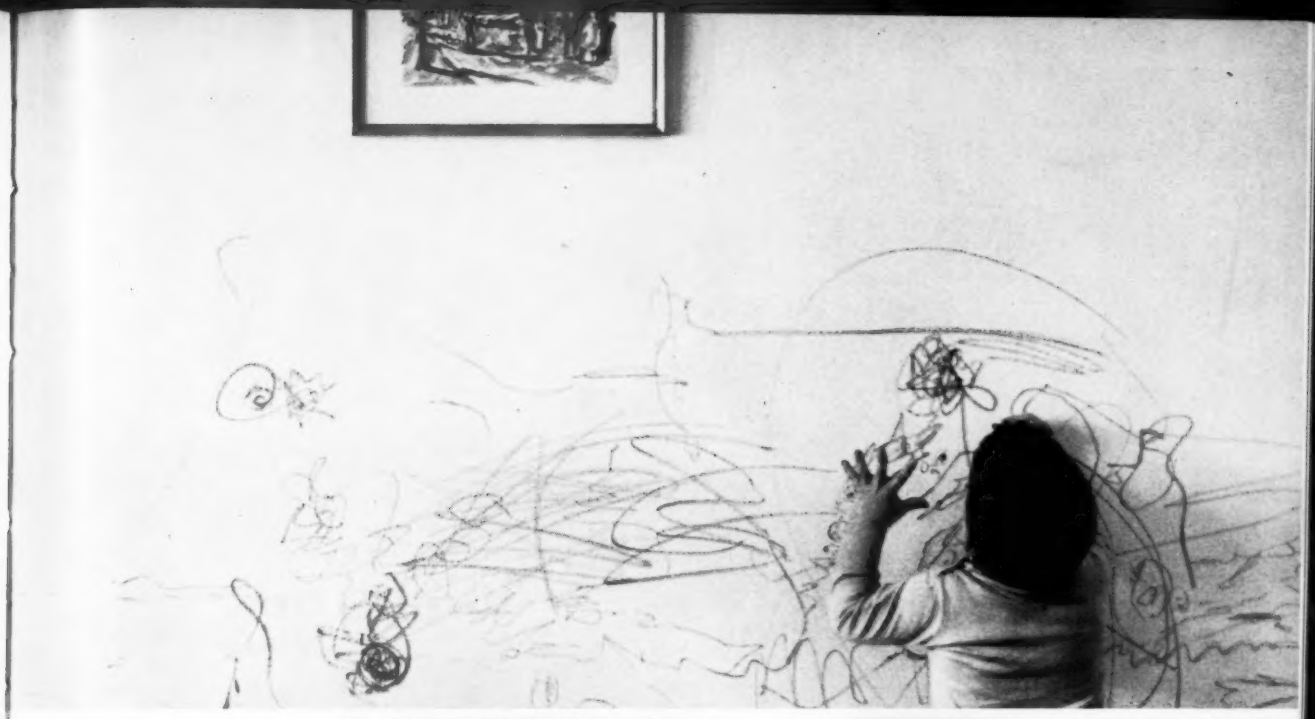

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Title (REG. U.S. PATENT OFFICE)

AUGUST 1961

Formerly PAINT and VARNISH PRODUCTION MANAGER

(Established in 1910 as The Paint and Varnish Record)

VOLUME 51
NO. 9

FEATURES

PRODUCTION

AEROSOL COATINGS

DEPARTMENTS

NEXT ISSUE

The manufacture and formulation, testing and evaluation of traffic paints will be covered in our September issue.

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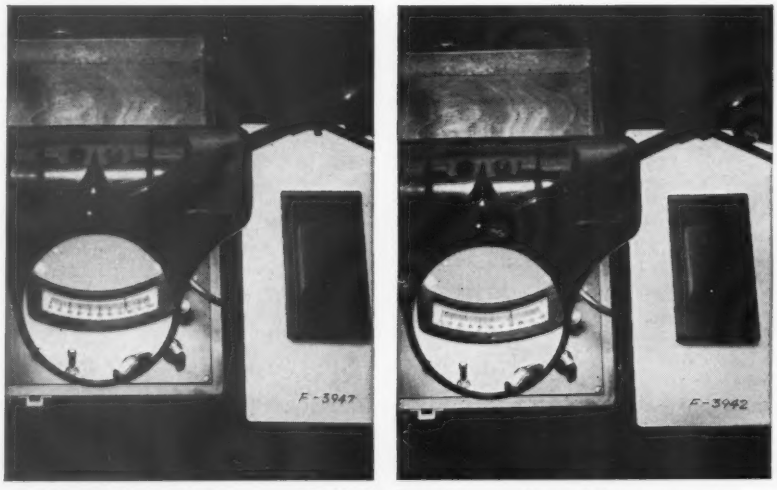
ACRYLIC FORMULATORS:

Shell Chemical's new Pent-Oxone* and Pent-Oxol* high boiling solvents give you flexibility never before possible in high-low solvent systems for acrylic lacquers

New Pent-Oxone solvent is Shell's remarkable keto-ether. New Pent-Oxol solvent is a glycol ether.

Both are true high boilers which impart gloss to acrylic lacquers. They virtually triple the number of effective acrylic solvents you can choose from in the high boiling range.

For details, see below—and send for Shell's new technical bulletins.



Unrubbed acrylic lacquer with Shell's Pent-Oxone solvent, left, gives greater gloss reading (77) than identical formulation with equivalent amount of EGMEE acetate (72). Pent-Oxol solvent gives similar high gloss levels in acrylic lacquers.

As YOU KNOW, high-low solvent systems for acrylic lacquers place a heavy burden on high boiling solvents. For years, ethylene glycol monoethyl ether acetate has carried most of this burden alone.

Now, Shell Chemical has developed two new high boilers which lighten this load and give you a flexibility which has hitherto been missing in acrylic lacquer formulation.

Solution viscosity data

Both Pent-Oxone and Pent-Oxol solvents are highly active. Here is how they compare with EGMEE acetate in solution viscosity (cps.) for three widely used Rohm & Haas acrylic resins:

	A-21	B-44	B-66
Pent-Oxone solvent	22	20	15
EGMEE acetate	26	23	16
Pent-Oxol solvent	30	25	25

All three resins were reduced to 15 per cent by weight as follows: A-21 with 45 parts toluene, 5 parts butyl alcohol and 50 parts indicated solvent; B-44 with 26.5 parts toluene and 73.5 parts solvent; B-66 with solvent alone.

Gives high gloss levels

Acrylic lacquers using Pent-Oxone or Pent-Oxol in the solvent system are characterized by gloss levels higher than can be obtained from any other high boiler at equal concentration.

These gloss levels *remain* high under a wide variety of application conditions, such as force dry time and temperature, spray room temperature, topcoat thickness, primer smoothness, pigmentation and operator efficiency.

This feature readily translates into lower manpower and elapsed-time costs in rubbing operations.

New technical bulletins

New technical bulletins are available from Shell on Pent-Oxone and Pent-Oxol solvents. Bulletin A deals with the physical properties of these products. Bulletin B deals with their use in acrylic lacquers.

For these bulletins, plus samples of Pent-Oxone and Pent-Oxol solvents, write to any of Shell's 9 Industrial Chemical Division offices or directly to Shell Chemical Co., 110 West 51 Street, New York 20, New York.

*Trademark, Shell Chemical Company

A Bulletin from

Shell Chemical Company

SHELL

Industrial Chemicals Division

EDITORIAL COMMENT

Communications and Morale

ONE of the biggest challenges facing management in this decade of economic growth and prosperity is the development of effective communications.

This important aspect of business was discussed by Charles E. Beach, president of Chemical Specialties Manufacturers Association at the group's 47th Mid-Year Meeting in Chicago. He said——

"Is a breakdown in the human aspects of communications a possibility today? Could it be that the smaller the world grows, the faster the pace of industry, the more complex our daily lives become, the closer we get to the possibility of a breakdown? Nations are unable to communicate with each other, husbands and wives and children are having trouble talking to each other. It's no surprise in business that we often fail to reach each other".

Mr. Beach stressed the role communications plays in a business organization, especially in developing employee morale and fostering job satisfaction which will ultimately be reflected in productivity, the employee's dealings with his fellow worker, the general public, and the firm's customers.

According to Mr. Beach, one of the most important factors which go to make up job satisfaction is the spelling out of the company's objectives in clearly defined terms.

Management can use many devices to accomplish this job effectively. One very satisfactory method is making use of employee magazines which should be mailed to the employee's homes.

The use of bulletin boards are recommended as a means for communication. These should be confined to short notices, requiring less than three minutes of reading. Notices should be brief and simple as possible. It is important that the bulletin board be kept neat at all times and brought up-to-date at least once a week.

Letters can be most effective, if they are mailed directly to the employee at his home. One technique which is claimed to bring best results is frequent meetings of small groups of workers and their supervisors.

The primary criticism leveled against management communication programs is that it has paid too much attention to media and devices, too little to purpose and content.

Many executives have encountered difficulties because they over simplified the problem and concept of communications. As Mr. Beach aptly said——

"The employee has a right to know about the company's product, its history, its general policies, and its positions in the community. He wants to know how his performance rates, the relative position of his job with respect to the whole company, and his chances for advancement, and training."

To accomplish this management must resort to the most effective means of communication available. Systems provide the tools both for collecting and interpreting data with speed, and also of working out the means of transmitting it in time to be of value.

Because communication is a two-way street, management must, also, be a good listener. This means the executive should make himself available to his subordinates. Objectives and goals should be discussed, and a review of performances be made by both parties.

Communication is one aspect of employee relations. Before anything can be gotten across, it is important that a climate of respect and receptivity exist for management.

PVP

Serving Administration and Technical-Production Management of Coatings Manufacturing Plants

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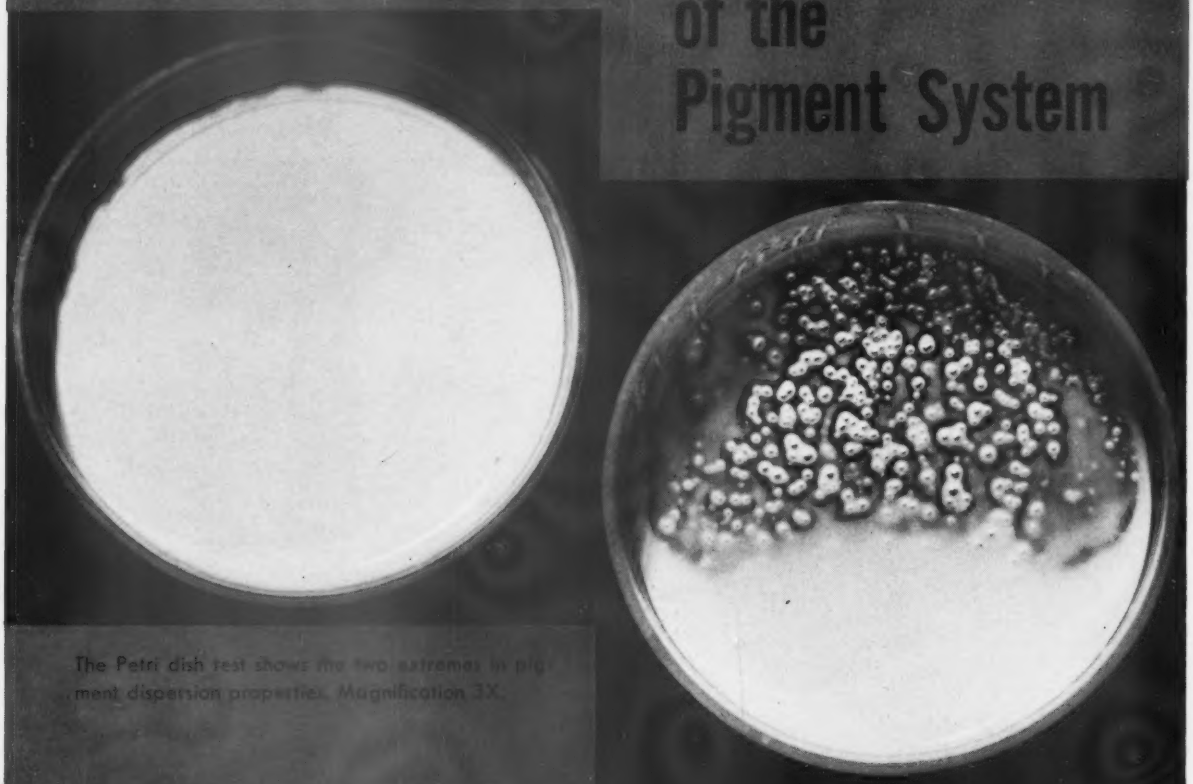

The Petri dish test shows the two extremes in pigment dispersion properties. Magnification 3X.

HORSE HEAD® R-750 TITANIUM DIOXIDE

You wouldn't think of trying to proceed with the development of essential properties of a top-grade exterior latex paint starting with the dispersion shown on the right.

Actually, it's a highly exaggerated example of a highly unsatisfactory dispersion of a pigment system. But it does serve as a reminder of the importance of choosing for your new exterior latex formulations a titanium dioxide designed for fast and complete dispersion.

The only titanium dioxide you can afford to use is the kind shown in the dispersion on the left. And this one is no exaggeration. It's HORSE HEAD R-750 titanium dioxide and it illustrates the fast wetting and easy dispersing properties which are making this pigment the choice of an ever-increasing number of makers of emulsion-type finishes.

Why not send for a sample and make your own dispersion test?

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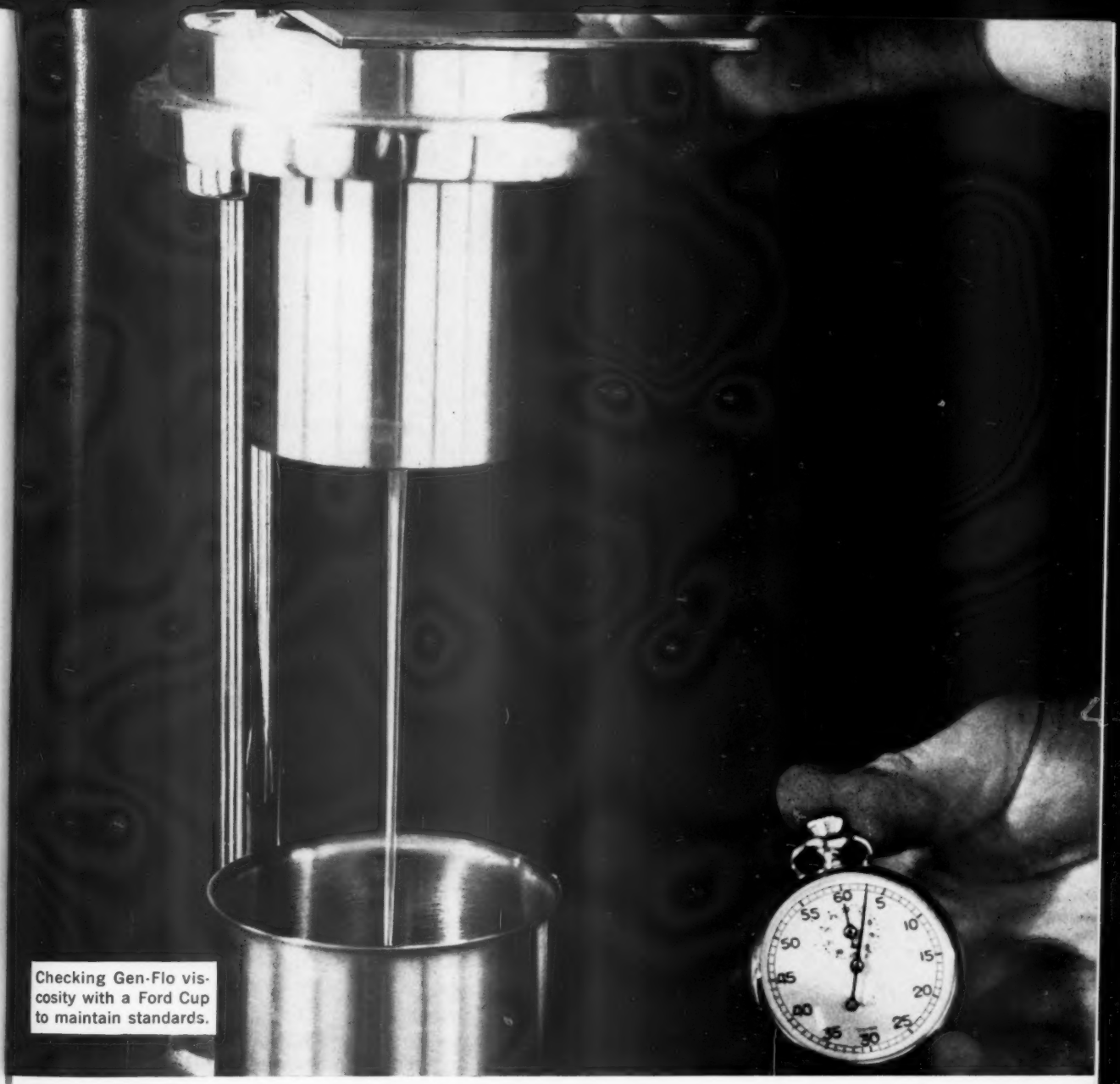

Checking Gen-Flo viscosity with a Ford Cup to maintain standards.

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You can count on easier, more economical paint production when you use Gen-Flo because Gen-Flo styrene-butadiene latex is carefully produced and thoroughly tested by skilled technicians to assure the ultimate in quality and uniformity. And with Gen-Flo you can keep your latex inventories within reasonable limits... shipments are made on a completely "tailored-to-your-needs" basis. Let us show you how Gen-Flo can cut production and inventory costs... increase profits! Write or call for information today!

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PVP PAINT AND VARNISH PRODUCTION

MANAGEMENT NEWSLETTER

A MONTHLY REPORT FOR MANAGEMENT OF THE COATINGS INDUSTRY

AUGUST, 1961

A PLEA TO REVIEW a decision of the U. S. Court of Appeals has been filed by the Glidden Company with the U. S. Supreme Court in the case of Zdanok vs. Gliden. At issue is the Court of Appeals' ruling that employees have "vested" seniority rights after their working contract has expired, their employment has been terminated and the plant in which they worked has been closed. The case stems from Glidden's closing of a food processing plant in Elmhurst, N. Y., in 1957, and the firm's subsequent opening of a new plant in Bethlehem, Pa. Five former Glidden Employees at Elmhurst claimed their contract implied seniority rights created by the contract would survive expiration of the contract. A U. S. District Court in New York found in favor of Glidden, but the Court of Appeals upset that decision, awarding Elmhurst employees seniority rights at Bethlehem. A Glidden spokesman said the firm did not close its Elmhurst plant to "run away" from employees there. He said the move was based on "sound business operating reasons," and that Elmhurst employees were offered the opportunity to apply for jobs in Bethlehem. The firm did offer jobs to the two employees who applied, he said, and it also helped former employees find new jobs at comparable pay in New York.

THE BUSINESS RECOVERY continues to move ahead, and forecasters look for even greater advances in the months to come. Latest available records show that new orders for durable goods rose two per cent in May for an over-all gain of 16 per cent from the recession low in January. Shipments of manufactured goods are just about keeping pace with new orders, reflecting manufacturers' promptness in stepping up production, and the high level of stocks of finished goods. Merchants report that retail trade is finally on the upgrade after poor showings in the early months. On the construction scene expenditures are moving upwards to the highest level since 1959, with residential and heavy engineering work in the forefront. But don't be surprised if a slowing in the rate of recovery is evident when June figures are released. Economic progress in June would have had to go some to equal the rapid rise recorded in April and May.

ECONOMIC IMPROVEMENTS in the U. S. seem to be spilling over into neighboring Canada. The Bank of Montreal reports encouraging signs throughout the Provinces. Wholesale and retail trade has picked up all through Canada, except in the Maritime Provinces. Although sales of heavy equipment are slow, the lumber industry shows signs of good health, with hardwood demands reported good at steady prices and sawmills reported busy across the Provinces. Following recent changes in Canada's exchange rate policy, the U. S. dollar has soared to a substantial premium.

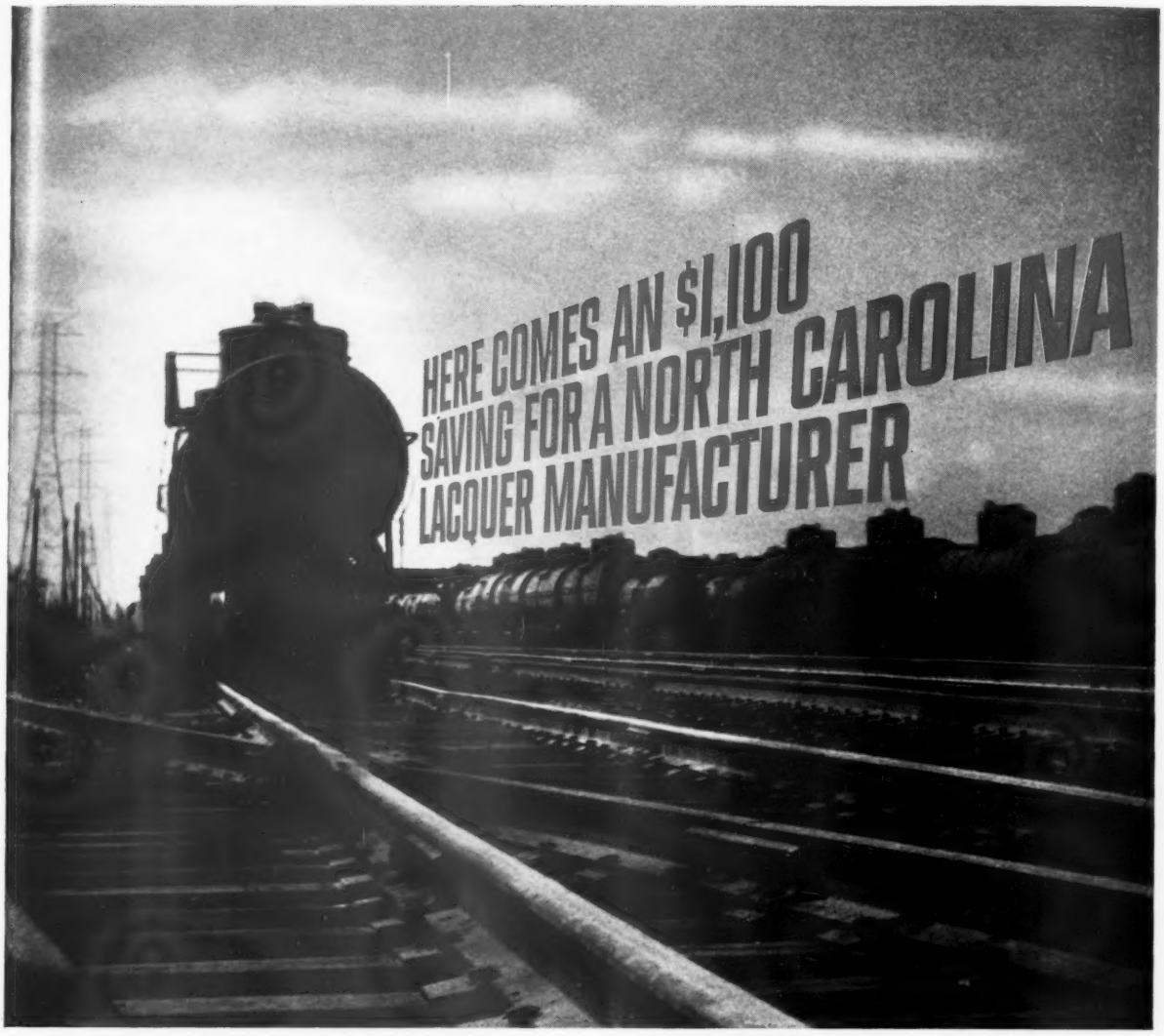
PAINT ON MASONRY surfaces has been shown to withstand the elements better when applied over coats of a new isocyanate

primer-sealer base recently tested by chemists of the U. S. Naval Research Laboratory. Due to the wide variety and conditions of masonry surfaces, water-base paints used with customary surface sealants have not met with unqualified success. The new primer-sealer, however, contains a commercially available material of the isocyanate type that shows promise as a base for acrylic emulsion paints. It is a free-flowing, penetrating liquid. Upon evaporation of a solvent, the solid isocyanate reacts with atmospheric moisture and ultimately cures to a tough, resinous film. Spot tests at the Naval Research Laboratory showed the film had outstanding adhesion qualities after one year. A report, "An Isocyanate Primer-Sealer for Masonry," is available for 50 cents from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Order PB171 107.

MARINE PAINT SALES to pleasure boat manufacturers may feel the pinch of a 30 per cent decline in national boat sales through the spring months. But some relief is in sight through the expanding foreign market for U. S. craft. Leading manufacturers look for foreign sales gains of from 10 to 36 per cent this year. Chris-Craft is said to be forming a Swiss subsidiary to handle the growing European market. Roamer Steel Boats reports that a wide variety of its models are now on the French and Italian Rivieras. Two chief reasons for the expanding European market are an up and coming middle class with more money to spend and liesure time to spend it in, and increased European manufacturing costs which have bitten into the traditional competitive advantage of foreign builders.

PLASTIC-COATED HARDBOARD that looks like wood and is intended for use as an exterior home siding, is being developed by Masonite Corp. The new product is designed to eliminate the need for periodic painting and will be priced competitively with aluminum siding. The siding is now being tested on a number of homes in Michigan, Minnesota, Arizona and Washington, to determine its ability to withstand various types of weather conditions. Although the product is expected to be ready for the market within two years, no decision has been made as to whether Masonite will manufacture the product or license an outside firm to produce it, as is the procedure with some other of the firm's products.

THE BEIGE COLOR GROUP leads in retail paint sales, but is now being closely followed by the mauves, blue-greens and yellows. The leading individual colors internationally include four shades of mauve, three blue-greens, and several yellows. Pink shades, while continuing their popularity in the U. S. and Canada, showed a gradual decline in overall international sales. Peach and orange shades are on the rise, a hint at vivid styles to come, while in the other direction, there was a spotty increase in browns and deep greens. These preferences are included in an international color preference survey, published twice yearly by a leading paint manufacturer. The survey is based on more than 147,000 retail paint sales and includes a breakdown by areas of retail sales and color preferences in the U. S.



He switched from n-butyl acetate to **Eastman ISOBUTYL ACETATE** and is saving 14¢ per gallon. That's more than $1,100 for an 8,000-gallon tank car.

Lacquer makers everywhere are finding it easy and profitable to switch to Eastman Isobutyl Acetate for their medium-boiling solvent needs. It can be used interchangeably with n-butyl acetate in most lacquer formulations. In nitrocellulose lacquers, for example, it produces no significant change in film properties or application characteristics.

Eastman Isobutyl Acetate can often be used as a replacement for methyl isobutyl ketone at a saving of 5¢ per gallon.

Or, use it to simplify your formulating by eliminating solvent blends and save money in the process. The cost per gallon of Eastman Isobutyl Acetate will probably be less, for example, than the cost of blends of n-butyl acetate with sec-butyl acetate or n-propyl acetate.

Ask your Eastman representative to show you how a switch to Isobutyl Acetate can lower the solvent costs of your present lacquer formulas.

Eastman
CHEMICAL PRODUCTS, INC.
Subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE

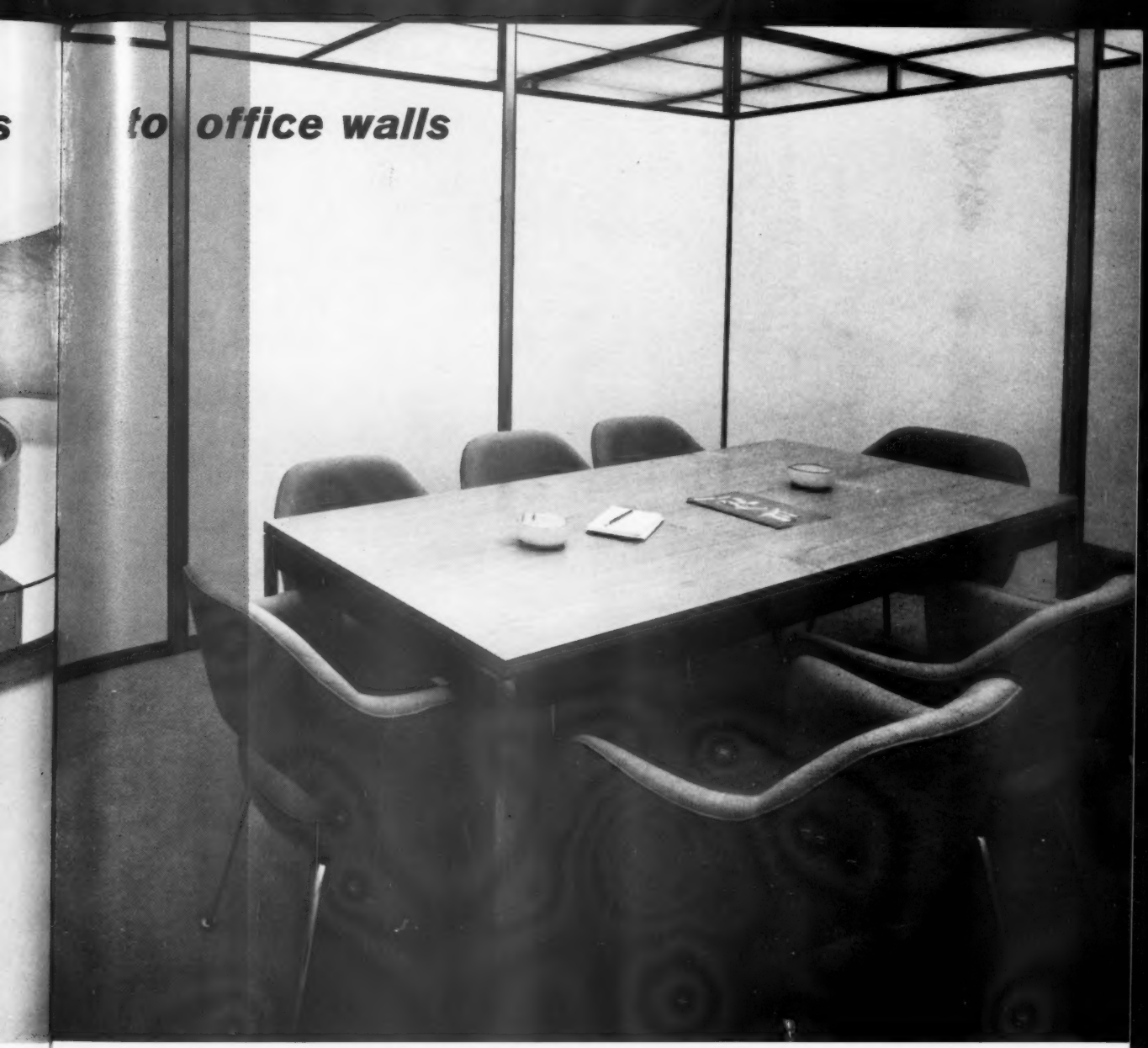
SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, N. C.; Houston; Kansas City, Mo.; New York City; Philadelphia; St. Louis. **WESTERN SALES REPRESENTATIVE: Wilson & Geo. Meyer Company,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

A vinyl organosol coating, "Armorhide," protects the surface of counters and metal partitions in the newly constructed office of the Marine Trust Company of Western New York at Buffalo. Made from BAKELITE Brand Vinyl Resins, this tough counter coating resists perspiration, scratching and abrasion. "Armorhide" coating is marketed by John L. Armitage and Company, Newark, New Jersey.

There's Durability in BAKELITE® Vinyl

Coatings based on BAKELITE Brand *Vinyl Dispersion Resins* have established their superiority in a wide variety of product applications. They provide lasting good looks, outstanding protection, increased product saleability—and, because of the inherent flexibility of vinyl, production line techniques are simplified and reduced in cost.

BAKELITE is a trade mark that has been recognized by the coatings industry to signify the utmost in *quality* and *service* for more than 25 years. Investigate now how BAKELITE Brand Vinyl Dispersion Resins will help you to expand your sales in the rapidly growing market for indoor and outdoor metal coatings.



More than 20 miles of moveable partitions in the new Union Carbide Building in New York City make this the largest installation of its type in the history of the partition industry. Abrasion-resistant and attractive panels, such as these, are manufactured by E. F. Hauserman Co., Cleveland, Ohio. Many are protected with a vinyl organosol coating formulated by Interchemical Company, New York, N. Y.

Dispersion Resin-Based Coatings

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The Cary Company, Chicago, Ill.
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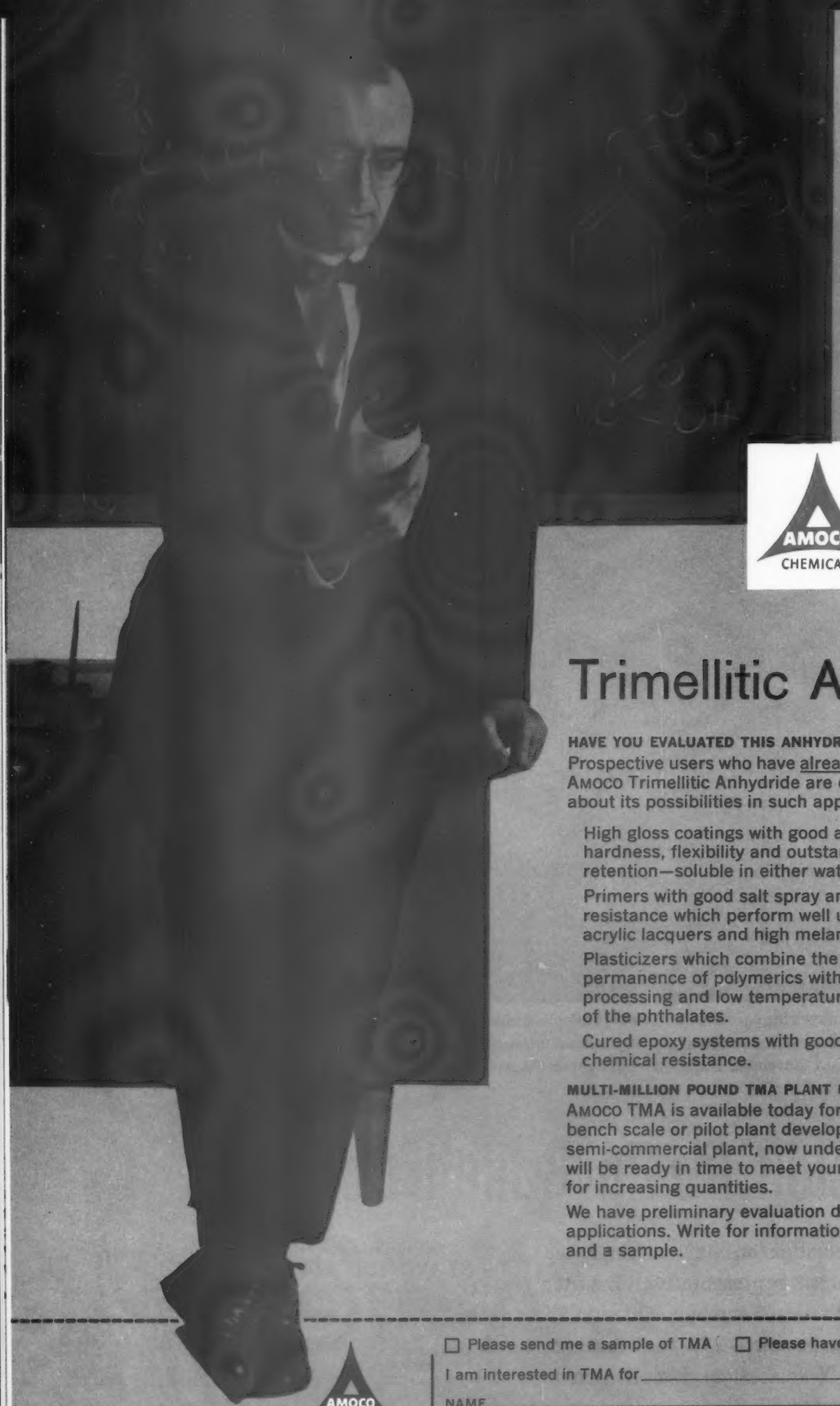

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High gloss coatings with good adhesion, hardness, flexibility and outstanding color retention—soluble in either water or solvents.

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Plasticizers which combine the good permanence of polymerics with the easy processing and low temperature performance of the phthalates.

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PVP PAINT AND VARNISH PRODUCTION

MANAGEMENT NEWSLETTER

A MONTHLY REPORT FOR MANAGEMENT OF THE COATINGS INDUSTRY

WASHINGTON REPORT

AUGUST, 1961

RECOVERY seems to have arrived in the paint and varnish industry, with business showing remarkable zip, according to close observers at the National Paint, Varnish and Lacquer Association, with headquarters here.

The upturn in new housing, the record-breaking construction of all kinds in June, and other evidences of more or less full recovery in industry have buoyed the spirits of those in the paint and varnish field, industry spokesmen say.

The value of new construction put in place in June amounted to $5.1 billion; an annual rate of better than $61 billion. However, these traditionally are the "big" months in new construction and the overall outlook is for a year's total of around $58 billion. Spending for new construction in June was two per cent above that of June, 1960, but the actual volume likely was just about the same (due to differences in prices).

Spending for total construction in the first six months of '61 amounted to $25.5 billion, compared to $25.1 billion in the same period of '60. Industry observers expect the last half to be much higher this year than last year, and substantially higher than in the first half.

Factory shipments of paint, varnish and lacquer totaled $169.8 million in May, or 12 per cent above the April figures and two per cent below the corresponding month of May, 1960. May production of 58.2 million gallons was nine per cent above the April figure of 53. 7 million gallons.

However, these figures, released by the U. S. Bureau of the Census, are not adjusted for seasonal variations, the number of working days and other factors.

All in all, industry observers feel that the bases have been laid, in the first half, for sustained movement forward in the second half of '61 and that when the year is over, it will be seen that new records have been set for both production and distribution.

ALTHOUGH there are now close to 69 million persons gainfully employed (including those on vacation), there still will be close to five million persons unemployed even after the millions of school children trek back to work.

At the same time, Gross National Product (GNP) has passed the $505 billion a year rate, and personal income is being earned at a rate of $415 billion a year, or better. There is widespread agreement that the economy is out of the woods and on the upgrade.

But the President and those who are closest to him on Capitol Hill continue to emphasize the challenges, rather than the accomplishments.

Senator Paul Douglas (D.-Ill.), considered the No. 1 economist on Capitol Hill, has pointed out, in a little-noticed Senate speech, that interest rates are firming up again and that there is danger that the Federal Reserve Board will begin turning the credit screws.

Representative Wright Patman (D.-Texas), chairman of the

House Committee on Small Business, has openly voiced dissatisfaction at the slowness of interest reductions.

The President, who has moved only on a token basis to force interest rates downward, now is faced squarely with a big decision. He can follow President Harry S. Truman and President Dwight D. Eisenhower and allow the Federal Reserve Board a free hand.

If allowed such a free hand, it is obvious that the FRB would do what it has done in the past: hike interest rates and pinch off prosperity.

Will Kennedy react for or against "easy credit?" That is the $64 question in Washington today. If he favors "tight money," he will be accused of forgetting the army of unemployed, whose only hope for employment, ever, lies in an easier credit policy. If he favors "easy credit," he will be accused of feeding the fires of inflation.

FOR ANYONE seeking an idea for a new product, or production technique, the latest supplement to the Patent Abstract Series, now available from the Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce, offers some promising possibilities.

This seven-volume third supplement to the first series published in '53 describes thousands of Government-owned patents, almost all of which are now available for license at no charge by private firms and individuals for non-exclusive use.

The ideas contained in these patents are yours for the asking, but each manufacturer must supply the imagination and initiative to realize the latent benefits involved, officials have pointed out.

U. S. SMALL Business Administration here has released a Management Research Summary entitled, "Problems and Needs of Small Manufacturers," which is available at no charge from the SBA's field offices.

It is based on the full report, which may be purchased for $2.50 from the Industrial Development Branch, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, 13, Georgia. This research study was made under a grant from the SBA.

The attraction and use of manpower resources is one of the most serious problems facing a small manufacturer in developing his organization, the summary pointed out, but cost control and sales promotion are areas in which many small manufacturers feel the greatest need for more assistance.

A small manufacturer can prevent the accentuation of many internal problems, the report notes, if he(1) limits his field of competition to that in which he is capable of competing successfully; (2) possesses or acquires management skill and technical knowledge; (3) takes full advantage of the abilities of his subordinates; and (4) recognizes the fact that manpower resources are no less valuable because his business is small; (5) keeps complete and accurate records and bases his operating decisions on known facts, and (6) takes advantage of the flexibility that his size affords in adapting to changing situations.

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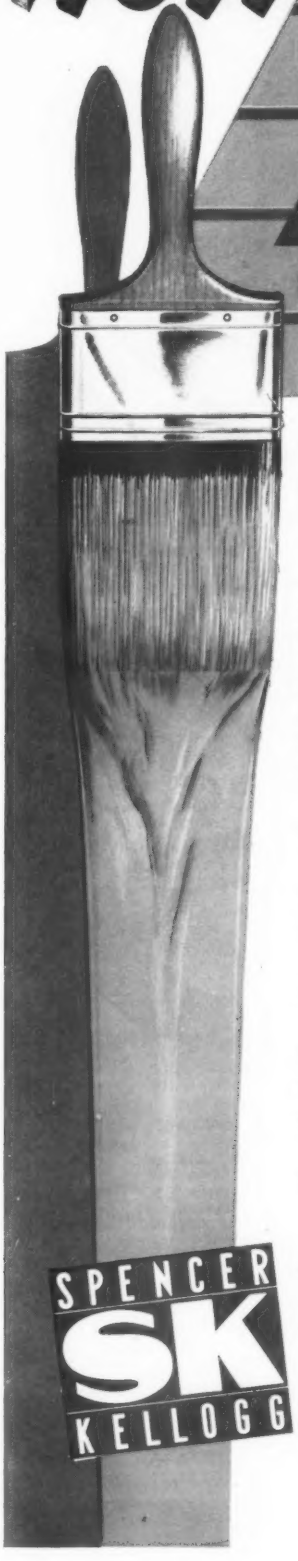

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- Adhesion to chalky surfaces.
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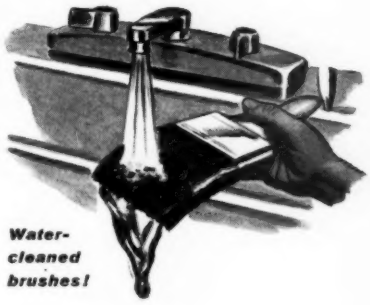
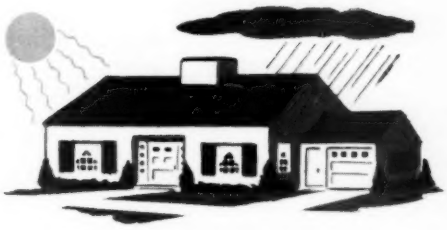
With Linaqua new wood requires only ⅔ as much labor and paint, as latex. Repainting requires only ⅓ as much paint and labor as latex.



Water-cleaned brushes!

Linseed oil performance!



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IN CANADA: The McArthur Chemical Co., Ltd., Montreal • IN MEXICO: Comsolmex, S.A., Mexico 7, D.F.

SUBJECT:	2-Nitropropane	DESCRIPTION:	Solvent for vinyl and epoxy coatings	ACTION DESIRED:	Consider 2-NP to achieve higher quality at lower cost

General

2-NP ($CH_3CHNO_2CH_3$) is a member of the extraordinarily versatile CSC Nitroparaffin family. Its most outstanding characteristic is its unique solvent property which permits the use of larger proportions of low cost alcohols and aromatics in solubilizing a wide variety of coating materials, dyes, organic chemicals, fats, and oils. This unique property is of special interest in the formulation of vinyl and epoxy coatings.

Solvent for Vinyls

With the introduction of 2-NP—for the first time—formulators of vinyl chloride-acetate copolymers were able to obtain coatings with 1) lower viscosity and/or higher solids, 2) medium evaporation rate with better flow, 3) improved solvent release resulting in reduced drying time, and 4) mild odor. In addition to these advantages, the ability of nitrated solvents to displace water results in coatings with better adhesion to hydrophilic surfaces and better weathering properties due to improved dispersion. 2-NP's high flash point and low volatility provide added safety factors.

Research and field experience in the packaging industry have shown that the high solids content of 2-NP-formulated vinyls offers important advantages in the high-speed coating of food and beverage containers. 2-NP also proves useful in vinyl ink applications since it does not attack gelatin or most rubber rolls but still provides outstanding adhesion or "bite" to many plastics.

Low Viscosity and/or High Solids Content

2-NP can be formulated to give vinyl solutions of higher solids content and/or lower viscosity than any other medium evaporating solvent. In addition, 2-NP solutions have good stability and show no tendency to gel.

Reduced Cost

In VYHH* solutions, to obtain comparable solids and viscosities, a 50-50 mixture of MIBK-toluol can be replaced by a 30-70 mixture of 2-NP-toluol. This makes it possible for a vinyl formulator to save over $600 in raw material costs for each tank car of MIBK he now uses.

Solvent for Epoxies

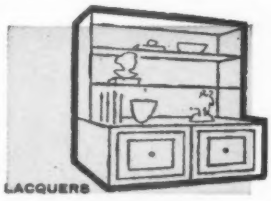
Solvent mixtures based on 2-NP have been found to be superior to other solvent systems for epoxy coatings cured at room temperature. Improvments brought about by the use of 2-NP include much greater chemical resistance, marked reduction in pinholing and water vapor permeability, minimized crawling and cratering, and improved adhesion.

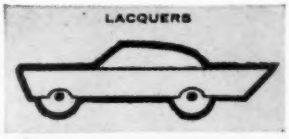
2-NP is compatible with amine catalyzed systems (with the exception of ethylene diamine) and systems employing urea-formaldehyde, polyamides, or phenolic cross linking agents.

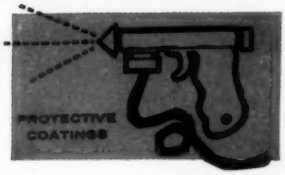
The ability of nitrated solvents to wet pigments and hydrophilic surfaces, as previously mentioned in the section entitled *Solvents for Vinyls*, also applies to epoxies as well as other vehicles used by the coating industry.

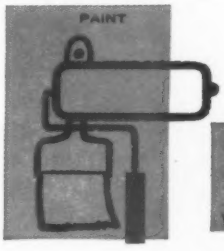
Want more information on 2-NP for Vinyls and Epoxies?

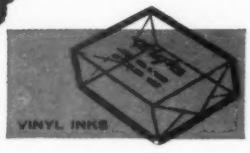
If you would like to have test samples and complete technical data on 2-Nitropropane for your vinyl and epoxy formulations, fill in and mail the coupon below.











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260 Madison Ave., New York 16, N. Y.

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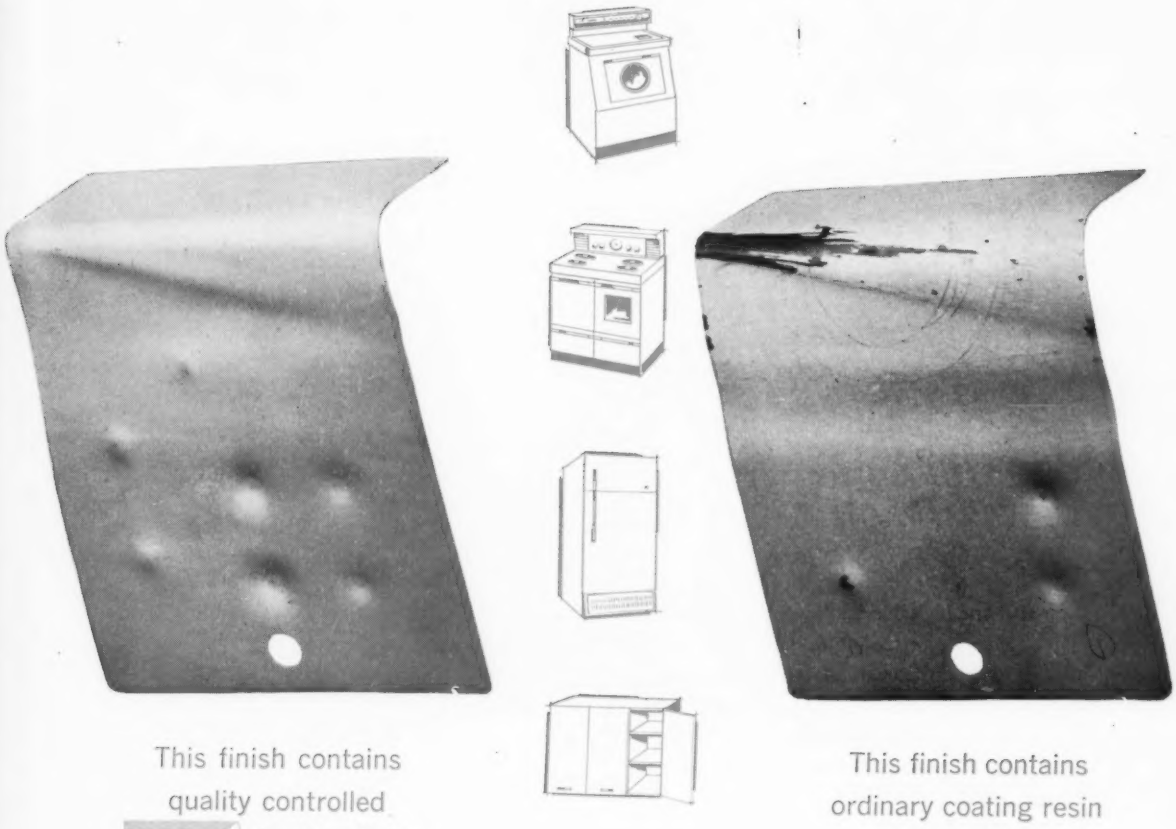

This finish contains quality controlled Plaskon Coating Resin

This finish contains ordinary coating resin

Compare these two unretouched photographs of surface coatings on metal panels. Notice the excellent adhesion after bending in the finish on the left. It is made with quality controlled Plaskon Coating Resin silicon alkyd ST881. Poor quality raw materials can cause poor adhesion, as shown in the surface coating to your right.

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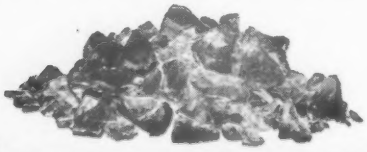
These processes include paint and varnish formulating, textile processing, paper converting, rubber compounding, floor covering manufacture, adhesive compounding, agricultural formulating, wax and rosin modification, blending with polyethylene and use in printing inks. Descriptions are also provided which indicate the usage of PICCOPALE in cement curing compounds, as an anti-dust coating, in waterproof packaging, and concrete curing.



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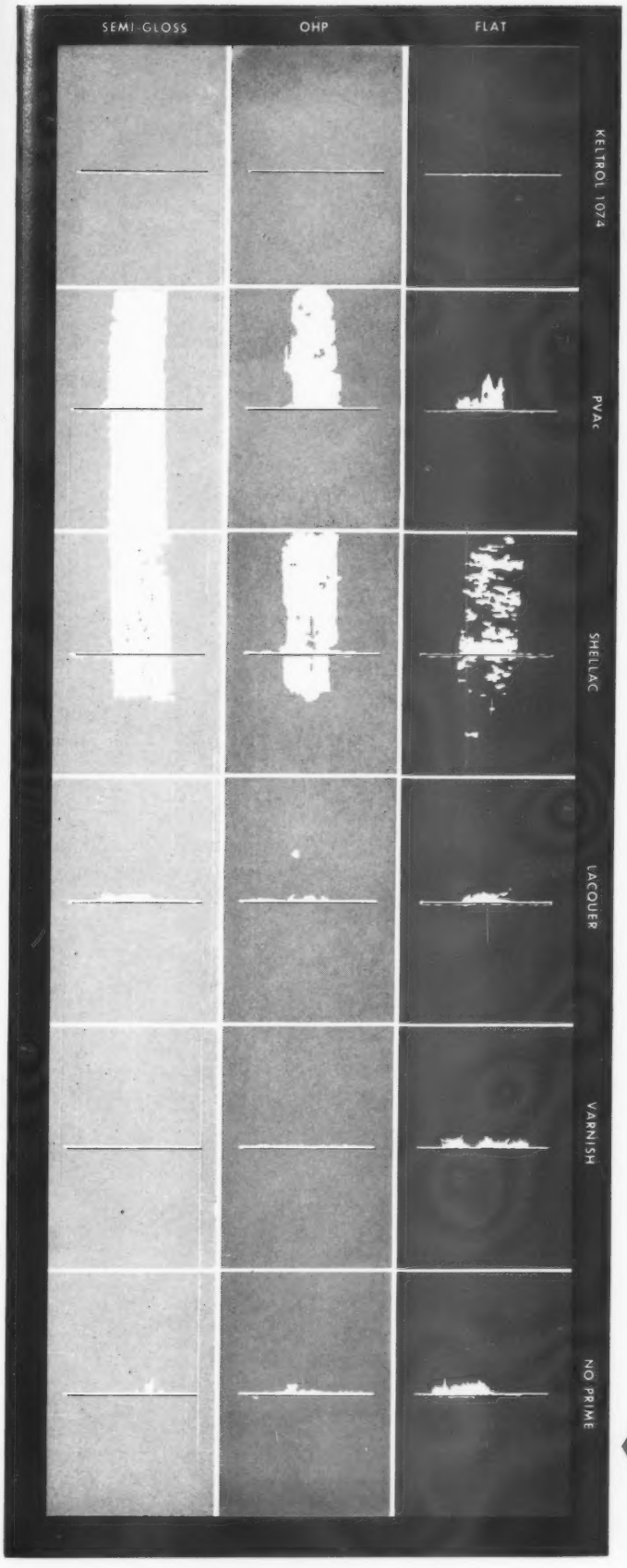

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3. Excellent Sealing of Raw Wood
4. Outstanding Topcoat Adhesion
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6. Light Color
7. Moderate Cost

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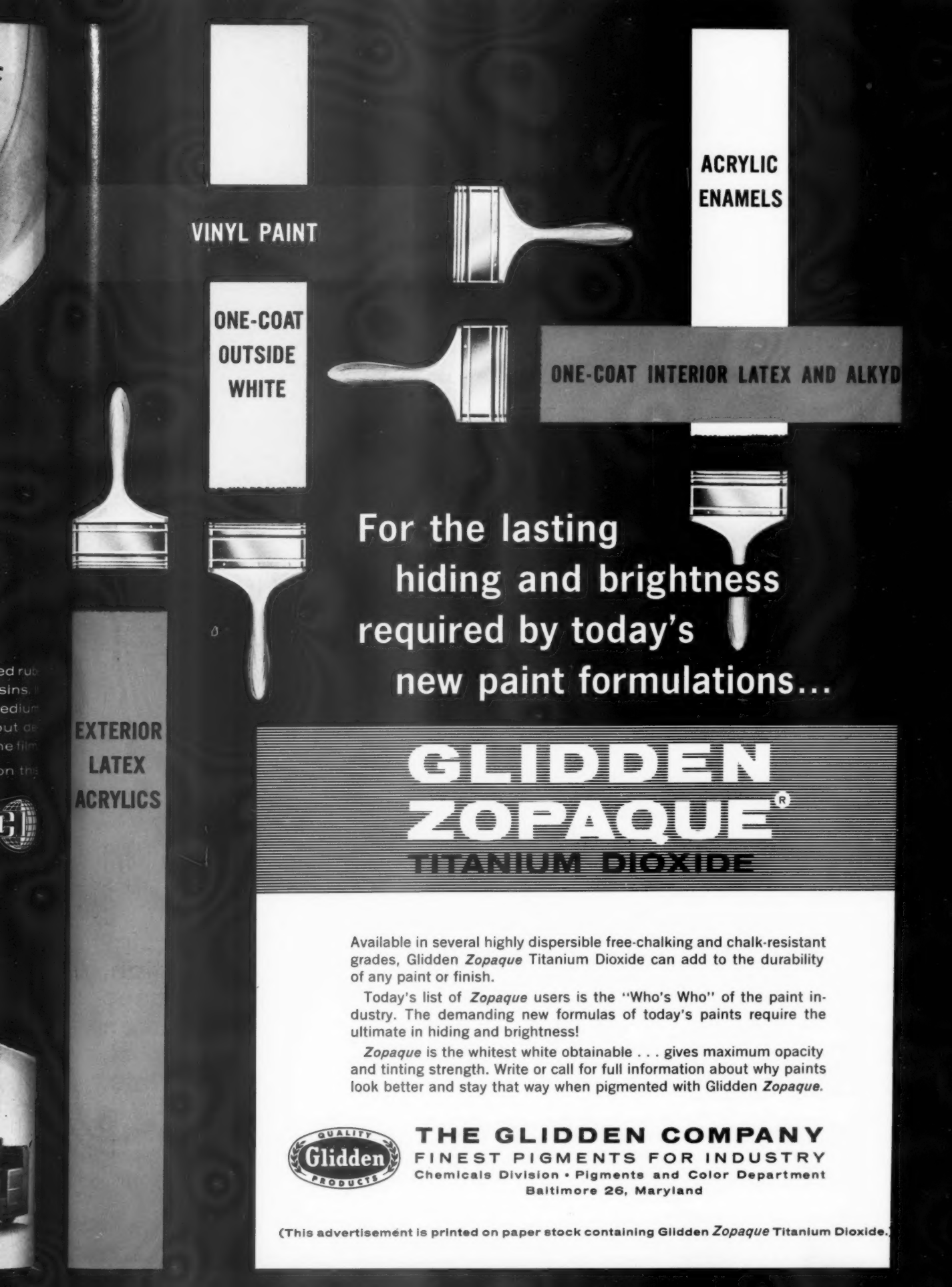

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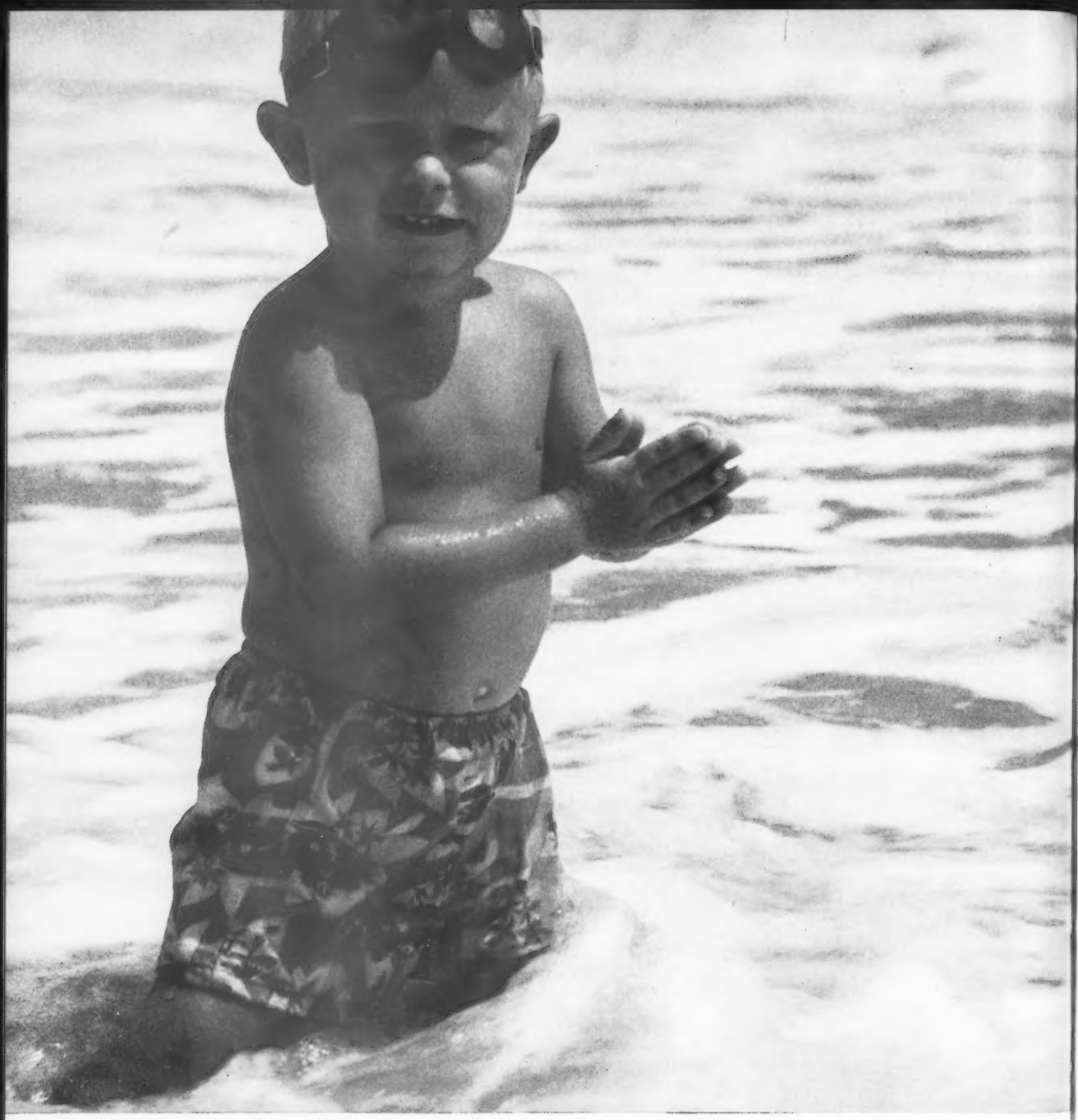

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SILICAS IN COATINGS

The use of natural and synthetic silicas in protective and decorative coatings and allied products.

By
Sidney B. Levinson

SILICAS cover a major group of extender pigments with varying particle size and shape but consisting of almost pure SiO_2. There are two major types, i.e., the natural or mined grades and the synthetic or chemical types.

The natural silicas have been known and used in coatings for decades. Their principal attributes lie in the following properties common to all silicas: Inertness, Transparency, Tooth, and Hardness.

The "Inertness" of silicas allows their use with reactive vehicles such as those with high acidity without causing any problems in package stability, e.g., excessive bodying during storage. Moreover, they are not affected by exposure to chemical fumes, cleaning solutions, etc. Thus, they are ideal as extenders for highly resistant finishes.

"Tooth" is a trade term meaning high resistance to slip. This property of silicas makes them useful in primers in which they enhance adhesion to substrates, and in so-called non-skid topcoats.

All extender pigments are relatively transparent. However, when dispersed alone in a vehicle, most extenders will be found to have enough opacity to make the films translucent rather than transparent. In this respect silicas are unique in that they generally will produce more transparent films than most other pigments.

Sidney B. Levinson, Vice-President and Technical Director of the D. H. Litter Co. and David Litter Laboratories, attended The College of the City of New York and received his Masters degree in Chemical Engineering in 1933. His entire professional career has been spent in the paint industry.

Mr. Levinson was an officer of the New York Society for Paint Technology and a member of the Society's numerous committees, acting as chairman of many of them including the Technical Committee. He was chairman of the Technical Education Committee of the New York Paint, Varnish, and Lacquer Association, and group chairman in Committee D-1 of ASTM. He has lectured for the New England Paint Course, Newark College of Engineering and the New York Paint, Varnish & Lacquer Assoc. Sales Training Program. He is a recipient of the Roy H. Kienle award and the PaVaC award.

The 'Hardness" of silicas is far superior to that of most extenders in common use. Their Moh hardness rating is 5 vs a value of only 1 for talc or clay. (The Moh scale varies from the lowest value of 1 for talc to the highest value of 10 for diamond.) This property makes silicas valuable in coatings developed for high resistance to abrasion.

Thus it is evident that natural silicas are interesting and useful extender pigments. However, during the past decade, new synthetic silicas have been produced. These pigments not only have the above properties inherent in silicas, but, in addition, have other unique attributes as a results of specifically developed particle size and shape. Moreover, the original inherent properties have also been exaggerated to a marked degree by these new developments. As a result, these pigments are far more effective than the common silica extenders and have become so-called "Functional" pigments, i.e., they are able to efficiently perform functions in coatings other than, but often more important than, producing opacity and color (the functions of the "Prime" pigments).

These other properties are: Viscosity and Thixotropy, Flatting and Film Reinforcement. The extent of these properties depends on the method of manufacture, particle size and particle shape.

"Viscosity" is inherent in all high oil absorption pigments, a common attribute of all synthetic

silicas. However, some of these silicas have a remarkable ability to produce extreme "Thixotropy" in coatings. Thus, when used in small concentrations, they enable the formation of thick non-sagging films. Moreover, their inertness allows their use in highly reactive polyesters. Thus, they are used to produce "Gel" coats of polyester on the side of a mold to provide a base for further coats in the production of a molded boat, for example. They are used in a similar manner with vinyl plastisols to mold a thin sheet product such as a doll.

"Flatting" is the ability of an ingredient in a coating to reduce its gloss rapidly. This is no problem in a highly pigmented finish such as a flat wall paint. Any extender will do so in sufficient quantity. However, it is a real problem when semi-gloss and flat *clear* finishes are desired for use on natural wood furniture, for example. Synthetic silicas are ideal for this purpose. They reduce gloss very rapidly with little or no effect on transparency of the coating so that natural wood grains are not obscured in any way.

"Film Reinforcement" is a newly discovered property of silicas. This property is the result of a combination of the inherent hardness of silicas plus the effects produced by the particle size and shape of the synthetics. They have a remarkable ability of adsorbing the vehicle on their surface to the extent that they make the dry film tougher and thus improve resistance to abrasion markedly.

TYPES OF SILICAS

There are 6 major types of silicas covering both the natural and synthetic groups.

Natural (Mined)
Crystalline
Amorphous
Diatomaceous

Synthetic
Silica Gel
  Hydrogel
  Aerogel
Pyrogenic (Fumed)

The Natural silicas are mined, ground to the desired particle size, then screened to secure the final particle size ranges. During the process, the pigment is washed, then air floated and/or calcined to remove water soluble matter and undesirable metallic impurities such as iron or iron compounds.

Crystalline silica is mined from quartz rock or sand. Its particle shape is crystalline since this is the basic structure of the ore from which it comes.

Amorphous silica is mined from ores, which have no particular crystal structure, thus its name. Tripoli is an example of this type of rock.

Diatomaceous silica is mined from beds of Diatomite ore in

Figure 1. Diatomaceous silica. Magnification 500X.

California. This rock, which is almost pure silica, is composed of the skeletons of billions of tiny algae called Diatoms. These lived in the sea when it covered California millions of years ago. These tiny skeletons may be seen when Diatomaceous Silica is viewed under magnification. (See Figure 1).

The Synthetic silicas, on the other hand, are produced by relatively simple chemical reactions.

Silica gels are made by precipitation from sodium silicate

$$Na_2O \times SiO_2 + H_2SO_4 \rightarrow$$
$$x\ SiO_2 + Na_2SO_4 + H_2O$$

The precipitate is a gel, thus the name. This is washed to remove the sodium sulfate and then dried to form the pigment. The drying procedure determines the type of silica formed.

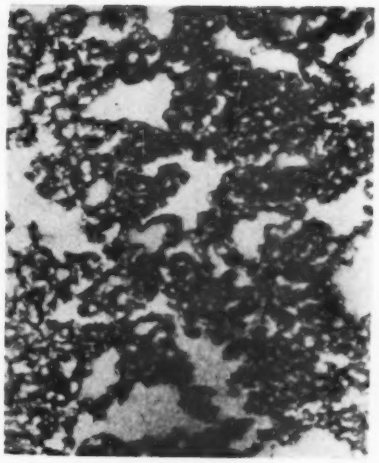


Figure 2. Silica gel.

Hydrogels are formed by drying under heat. During the process, the gel shrinks so that the final pigment particle is compressed to some degree. However, if the water is replaced by alcohol before evaporation, this shrinkage is reduced considerably. Another method used is that of drying under vacuum. Both methods produce more porous pigment called an Aerogel.

Both silica gels have a spongelike appearance under magnification. (See Figure 2).

Pyrogenic silica is produced by a unique process similar to that used in making carbon black. Silicon tetrachloride is mixed with natural gas and air, which are burned in a similar manner to the manufacture of carbon black. However, enough air is used so that no carbon is formed. Instead, as the gas burns it releases steam as a by-product and reaches a temperature of 3000°C. At this temperature, the

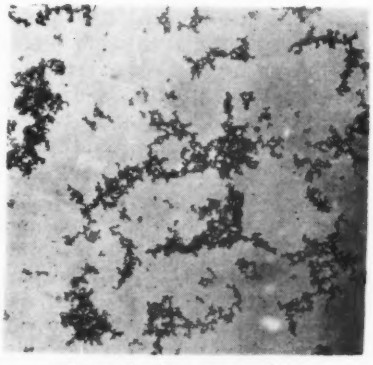


Figure 3. Pyrogenic silica.

steam reacts with the SiCl- to form a smoke or fume of pure silica.

$$C_3H_8 + 5O_2 \rightarrow 4\ H_2O + 3\ CO_2$$

$$2\ SiCl_4 + 4\ H_2O \rightarrow 2\ SiO_2 + 8\ HCl$$

The pigment particles formed by this reaction are spherical in shape and extremely small. These tiny spheres tend to gather in clusters. (See Figure 3).

PROPERTIES OF SILICAS

Although these silicas are the same chemically, they vary considerably in phycical properties and in cost.

Particle Size

Table I demonstrates the differences in maximum particle size and the major ranges of particle size among the various types of silicas used in coatings.

Table I
Particle Size — Microns (u)

	Maximum	Major Range
Crystalline	100+	2-20
Amorphous	50	2-20
Diatomaceous	100	1-20
Hydrogel	14	0.1-8
Aerogel	5	0.1-4
Pyrogenic	0.02	0.01-0.02

This is shown graphically in Figure 4. The long bars represent the overall ranges including the maximum size among the common brands. The solid bars show the major ranges of particle size omitting the relatively low concentration of oversize particles and of fines. The Pyrogenic silica particle sizes are so small that their size had to be exaggerated to even show on the chart.

A common specification for quality is that practically all pigments (99% +) should pass through a 325 mesh screen (44 u). This is shown on the chart as a line of reference.

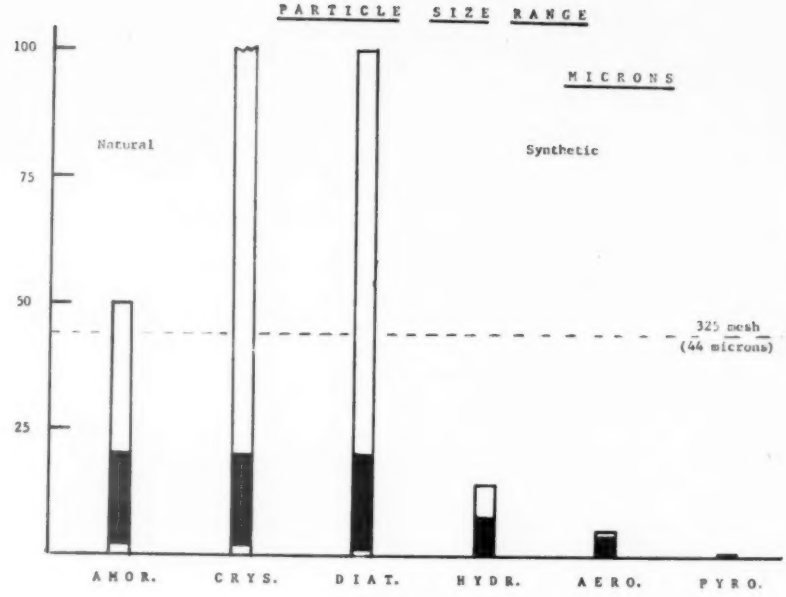


Figure 4

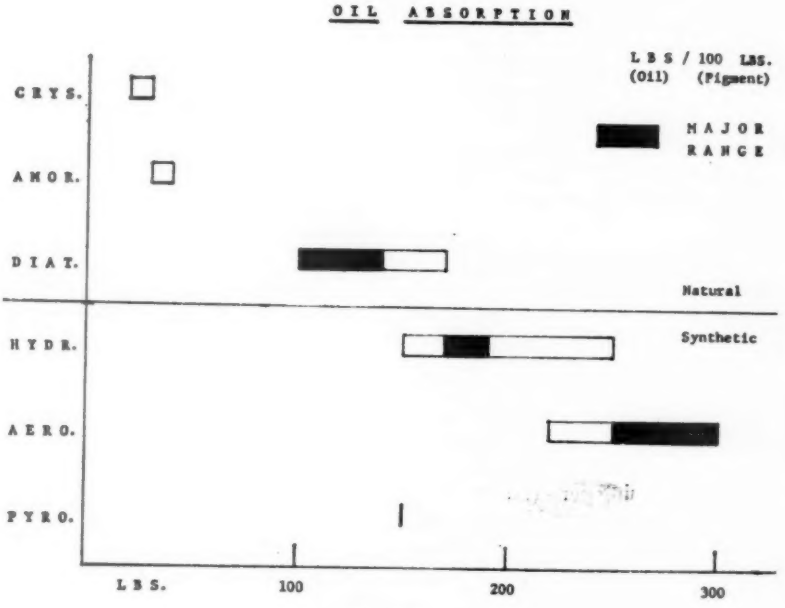


Figure 5

Oil Absorption

The synthetic silicas with their small particle sizes (thus larger surface area) have much higher oil absorption values than the natural grades. However, the Diatomaceous silicas also have high values because of their physical shape. (See Table II).

Table II
Oil Absorption—Lbs. Oil per 100 Lbs. Silica

	Overall	Major Range
Crystalline	20–30	20–30
Amorphous	30–40	30–40
Diatomaceous	100–170	100–140
Hydrogel	150–250	170–190
Aerogel	220–300	250–300
Pyrogenic	150	150

This is shown graphically in Figure 5. The complete bars denote the ranges of oil absorption among the various available brands; the solid bars show the ranges for the more common brands. It is interesting to note the narrow range for Pyrogenic silica. This is due to two factors: only one major supplier and exacting production control.

The overall variation in oil absorption from 20 to 300 lbs. of oil per 100 lbs. of pigment demonstrates that silicas are unique

Table III

Price per Lb. — c	
Crystalline	1-3
Amorphous	1-3
Diatomaceous	6-16
Hydrogel	50-75
Aerogel	60-75
Pyrogenic	75-95

among pigments of any type. Probably no other group of pigments can show this extreme variation.

Cost

The unique variation between different grades of pigment is even more evident when prices are considered. The prices for the synthetic types also clearly demonstrate the high costs for the highly functional types.

These costs reflect not only variations between grades but also between proprietary brands, variations in particle size and variations in sizes of shipments (1000 lbs. to carload).

The differences between the natural and the synthetic grades are quite evident. Note the sudden increase from 16c to 50c per pound.

The data is given in Table III and presented graphically in Figure 6.

PERFORMANCE OF SILICAS

General

All silicas have some properties in common because of the chemical nature of the product. However, some performance properties can be accentuated by physical (particle) size and shape. Moreover, these physical properties lead to other interesting performance properties as was discussed in the Introduction above. Table IV demonstrates the relative differences between the various silicas.

Silicas as Extenders

The low cost silicas are used principally as extenders where the inherent properties of silica are useful.

Crystalline silica is used in wood fillers. Its "tooth" prevents the filler from slipping out of the pores of the wood as the surface is wiped smooth after application of the filler. Its hardness aids in sanding since it will prevent gumming of the sand paper, and forms a tough undercoat for the subsequent coat of lacquer or varnish. Its "transparency" prevents cloud-

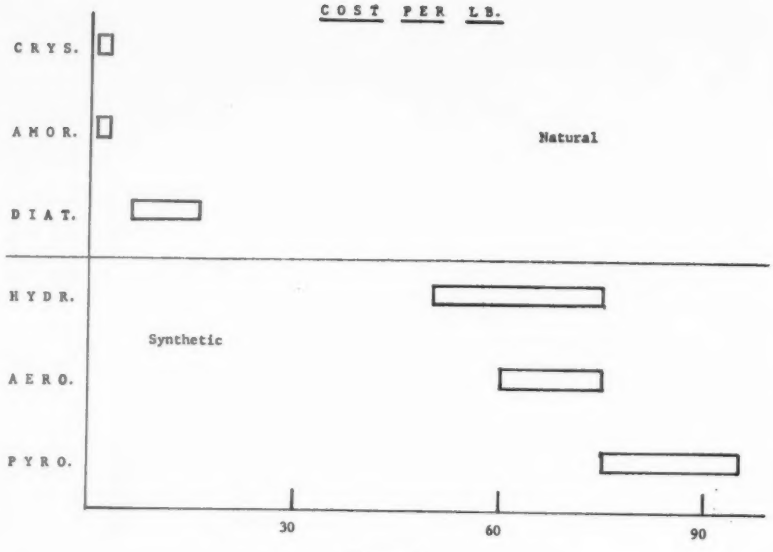


Figure 6

Table IV

Comparison of Properties

	Natural			Synthetic		
	Crys.	Amor.	Diat.	Hydro.	Aero.	Pyro.
Pigment Particle Av. Size	Large	→→→	→→→	Small	→→→	Ext. Small
Av. Shape	Crys.	Amor.	Needle	Sponge	→→→	Sphere
Thixotropy	VL	→→→	L	M	H	VH
Suspension	VP	P	F	G	G	EX
Transparency	F/G	→→→	→→→	VG	→→→	EX
Flatting	F	→→→	VG	EX	→→→	VG
Abrasion Resistance	G	→→→	VG	*EX	→→→	→→→

*As a result of film reinforcement rather than inherent hardness of the pigment.

Table V.

Thixotropy of Solvent Free Systems

	Brookfield (Poises)		Thixotropy Index
	2 RPM	20 RPM	2/20 RPM
Polyester			
Hydrogel	72	46	1.6
Aerogel	76	53	1.4
Pyrogenic	160	42	3.8
Vinyl Organosol			
Aerogel	240	160	1.5
Pyrogenic	850	290	2.9

Table VI.

Flatting of Clear Finishes

	Varnish		Lacquer	
	Satin	Flat	Satin	Flat
Gloss	50	20	50	20
Pigment Concentration (% on total solids)				
Diatomaceous	27	34	5	13
Hydrogel			2.3	7
Aerogel	8	10	2.5	6
Pyrogenic	10	14	6	14
Aluminum Stearate	12	23		
Pigment Cost (c per gal. of finished product)				
Diatomaceous	11	16	1.5	5
Hydrogel			2	7
Aerogel	14	17	2.5	7
Pyrogenic	16	21	7	17
Aluminum Stearate	13.5	22.5		

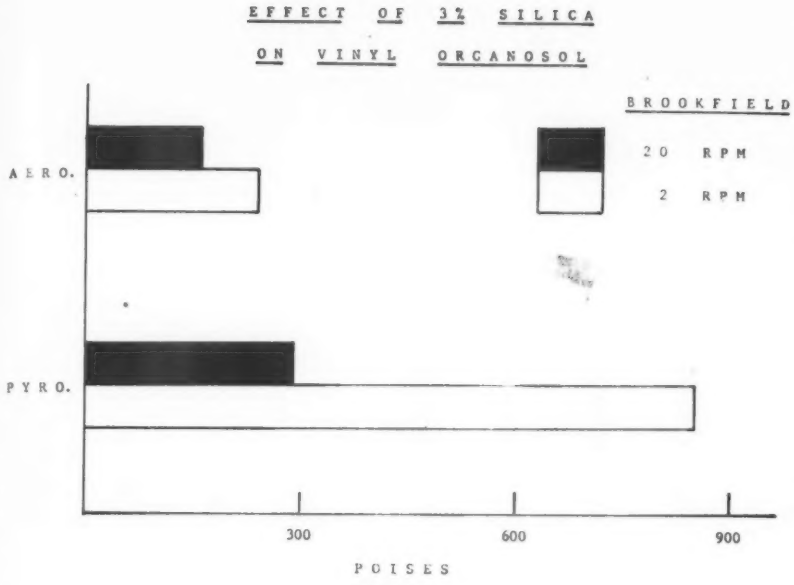


Figure 7

ing of the natural grain of the wood.

Amorphous silica is used as a flatting extender in latex paints. It aids in producing a velvety sheen (flatting), and it increases resistance to scrubbing (abrasion) so that erosion or burnishing of the paint, when stains are removed, is minimized. It is preferred to Crystalline silica because of its easier grinding and superior pigment suspension during storage.

Silicas as Functional Pigments

The other Silicas are more efficient, therefore can be used in lower concentrations. Moreover some have unique properties as a result of their physical characteristics. These properties may be demonstrated most clearly by comparing the silicas for some of these properties. Therefore, a number of these properties are covered in detail; the results given are based on actual data secured in laboratory investigation.

Thixotropy

Thixotropy in coatings is important when relatively thick films must be applied on vertical surfaces by brush, spray or trowel without sagging. An example would be the vertical side of a mold used to produce a polyester boat.

Other agents are available, which will produce thixotropy but none are as neutral as the silicas. Therefore, they are ideal for highly reactive systems such as epoxies and polyesters.

Table V demonstrates the relative efficiencies of the most effective Silicas in developing thixotropy in a typical polyester and in a vinyl organosol. (see Definition of Terms for description of Thixotropy and method of measurement on page 37).
Note the excellent efficiency of the Pyrogenic Silica. The data on the Vinyl Organosol is demonstrated graphically in Figure 7.

Flatting of Clear Finishes

All pigments will tend to reduce gloss if added in sufficient quantities. This is one of the major uses of extenders in paints, i.e., to produce flat finishes. However, very few extenders are capable of flatting yet maintaining transparency of the film so that the substrate is visible. This is of major importance in the development of clear low gloss finishes such as flat varnishes or lacquers for use on wood furniture. However, the more functional silicas are ideal for this purpose.

Table VI demonstrates the comparative efficiencies of these silicas in producing flat furniture finishes at two common levels of gloss; a satin or semi-gloss finish with a gloss reading of 50 and a dull or flat finish with a gloss reading of 20. Aluminum stearate, the former standard for flatting varnishes has also been included for comparative purposes. The results are shown both for a varnish type and a lacquer type of vehicle.

The above data is presented graphically in Figures 8 and 9.

Note the excellent efficiency of the Aerogel both in the varnish and the lacquer. In fact, a top quality satin finish lacquer can be made using only 2c per gallon of a high priced but extremely efficient extender. Also note that the cost of the diatomaceous silica is lowest of the group because of its low cost per lb. However, this is offset by its relatively poor clarity. On the other hand, Pyrogenic silica is expensive to use. Moreover, its

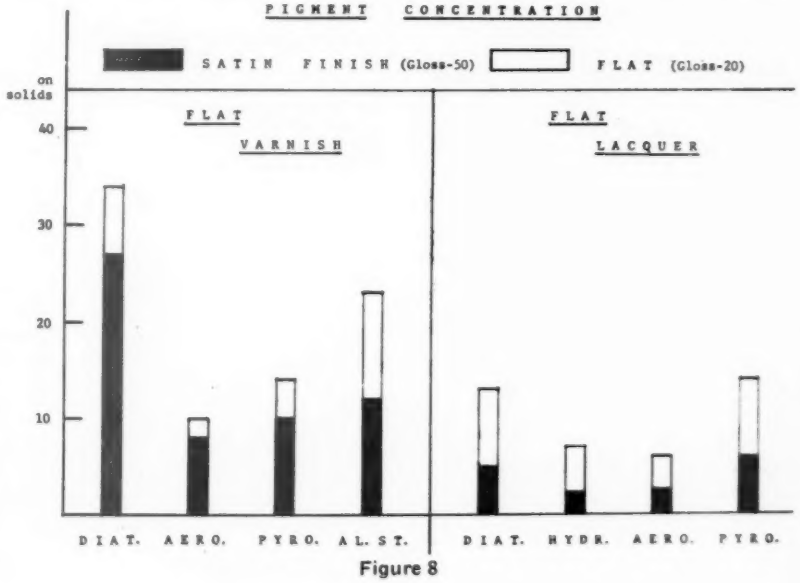


Figure 8

efficiency in production is low because of low mill loading (low pigment concentration in the mill base). These other properties are shown in Table VII.

The vehicle used obviously can have a marked effect on flatting efficiency as can readily be observed by comparing the relative silica concentrations required to produce varnishes and lacquers of equal gloss. This also occurs with alkyd varnishes of different viscosities. In general, the more highly polymerized the binder, the lower the concentration of silica required to produce equal gloss. Of course a more viscous alkyd will require more solvent, thus reducing its non-volatile content and its dry film thickness when applied. As a result the flatting efficiency of the more viscous alkyd varnish may be also improved because of the thinner dry film.

The effect of viscosity on flatting is shown in Table VIII and is demonstrated graphically in Figure 10.

Note the relative efficiency of the high viscosity (Flat Paint) alkyd vs. the low viscosity (Spar Varnish) alkyd.

Abrasion Resistance

The inherent hardness of Diatomaceous silica is used to advantage in the formulation of traffic paints. This property of the silica is useful in improving resistance of the Traffic Paint stripes to abrasion by heavy traffic. Thus it increases the useful life of the paint. This is demonstrated in the photograph showing the relative wear of 3 common types of extenders in typical traffic paint stripes after one year of service. (See Figure 11).

The synthetic silicas are even more efficient as a result of their unique ability to adsorb the vehicle and thus reinforce the film produced. This is spectacularly shown in the results obtained in formulating a low gloss baking enamel based on a Melamine modified alkyd. The data is given in Table IX and is shown graphically in Figures 12 and 13. The abrasion resistance was measured on a Taber Abrader (see Definitions of Terms).

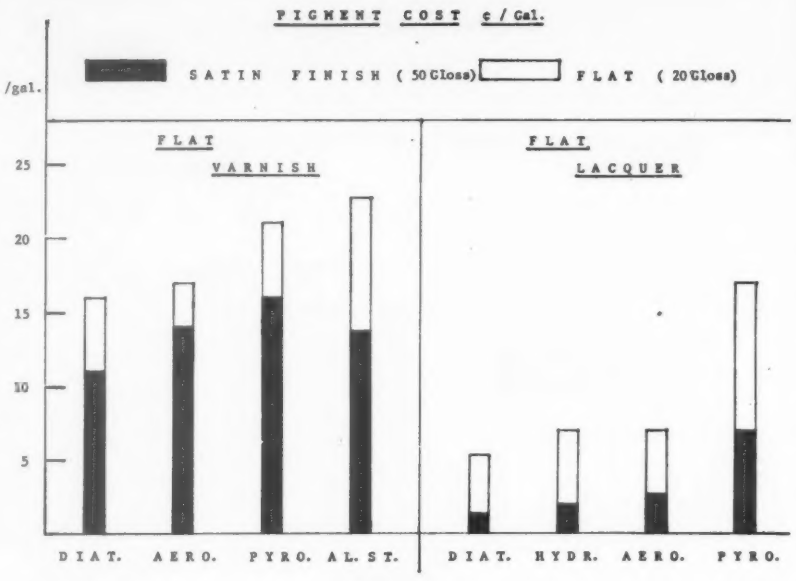


Figure 9

Table VII.

	Other Properties				
	Diat.	Hydr.	Aero.	Pyro.	Al. St.
Flat Varnish					
Mill loading	VH		M	L	VH
Suspension	F		G	EX	EX
Clarity of film	P		VG	VG	F
Smoothness	VG		EX	EX	EX
Mar resistance	P		VG	VG	P
Flat Lacquer					
Mill loading	MH	M	L	VL	
Suspension	P	VG	VG	EX	
Clarity of film	P	VG	VG	EX	
Smoothness	VG	EX	EX	EX	
Mar resistance	G	VG	VG	VG	

Table VIII.

Type of Alkyd used in	Effect of Alkyd Type: Oil Conc. (%)	Non-Vol. at C-E Viscosity	Silica Concentration (based on Non-Vol.): Satin	Flat
Flat Paint	50	30	9	10
4 Hr. Enamel	55	40	11	12
Spar Varnish	65	50	15	17
Increased Silica required in Spar vs Flat Paint type			+66%	+70%

Table IX

	Flat Baking Enamel (Gloss of 25) Pigment (% on N.V.)	Wear Factor (mgms/1000 cycles)
Clear finish	0	20
China Clay	22	95
Talc	23	150
Diatomaceous	14	55
Hydrogel	8	8
Aerogel	6	9
Pyrogenic	9	13
Efficiency of best Silica vs talc	385%	1,880%

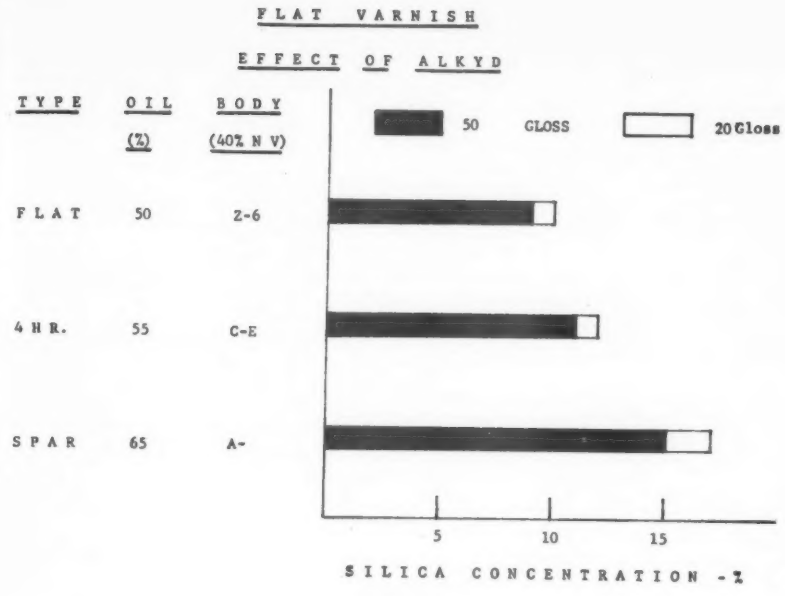


Figure 10

Note the excellent flatting and abrasion resistance of the synthetic silicas. Moreover, whereas the common extenders and diatomaceous silicas degrade the abrasive resistance of the clear vehicle, the synthetic silica, particularly the silica gels improve its abrasion resistance.

CONCLUSIONS

A number of conclusions may be drawn from the results evident from this review.

1. The Silicas, as a group, are an extremely varied family of extenders, probably more so than any other type.
2. Highly functional extenders may be well worth their high price despite their lack of opacity and color. In fact, Synthetic Silicas are desirable because they do lack both to a remarkable degree.
3. The more functional silicas are extremely effective in improving at least two of the following three properties to a marked degree:

Thixotropy, Flatting of clear finishes, and Abrasion resistance, with little or no loss in Clarity or transparency.

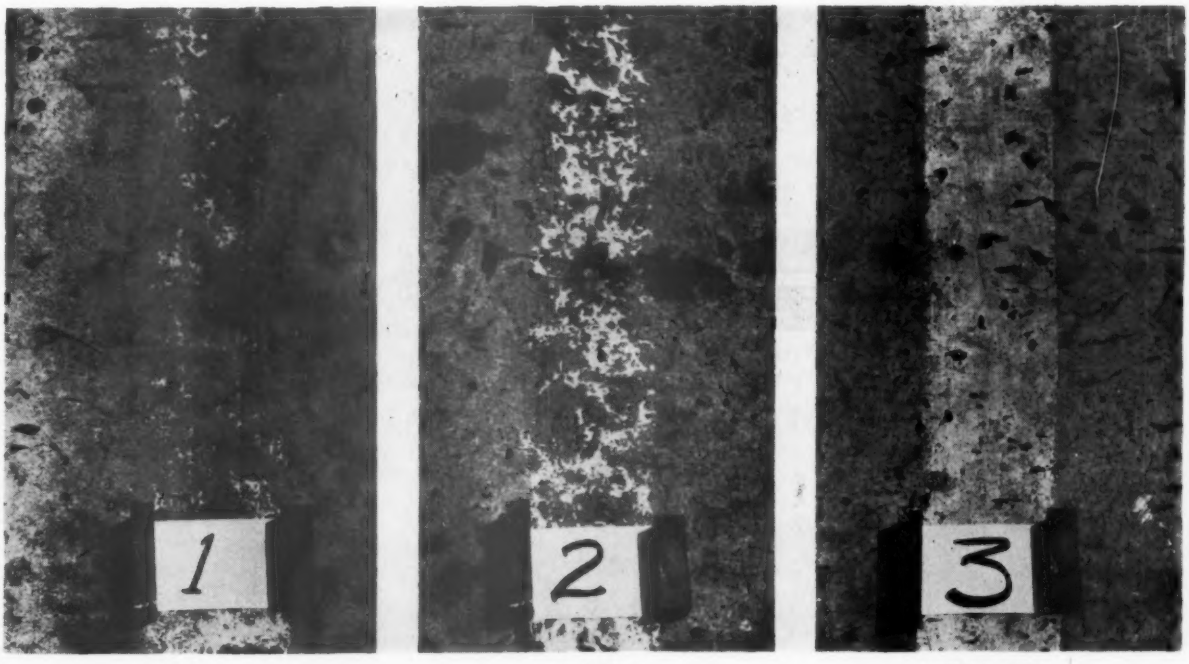
ABBREVIATIONS

Crys — Crystalline
Amor — Amorphous
Diat — Diatomaceous
Hydr — Hydrogel
Aero — Aerogel
Pyro — Pyrogenic
u — microns
EX — Excellent
G — Good
F — Fair
P — Poor
V — Very
H — High
M — Medium
L — Low
Av — Average
Ext — Extremely
50 — 60° Gloss of 50—Semi-gloss finish
20 — 60° Gloss of 20—Dull or Flat finish

DEFINITIONS OF TERMS

ABRASION RESISTANCE—The resistance of any coating to abrasion can be measured numerically by use of the "Taber Abrader." The coating is applied on 4" x 4" panels, which are rotated under two abrasive wheels under constant weight. The weight of the coated panel is measured before and after running the test for 1000 cycles (turns of the panel).

Figure 11. Traffic Paints—12 months.



Talc Whiting Diat. Silica

The loss in weight in milligrams is used to determine a "Wear Factor." Wear Factor = Loss in mgm per 1000 cycles. The lower the "Wear Factor" or loss in weight, the better the abrasion resistance of the coating. The result also depends on the weight used (250 or 500 gms) and the type of abrading wheel used (CS-10, CS-15 or CS-17) in increasing order of abrasiveness. Therefore, this data also is given.

FLATTING EFFICIENCY—This is a measure of the ability of a pigment to reduce the gloss of a coating when used in relatively low concentrations. The method of describing this property in this article is to present the concentration in % of Silica based on total solids (non-volatile) of the coating required to produce two levels of gloss—

Semi-gloss or Satin finish—50 gloss
Flat or dull finish —20 gloss
(Gloss is measured at 60°)

MILL LOADING—Concentration of pigment in the mill base. The higher values are desirable since more finished material can be made per batch of mill base.

THIXOTROPY—Also known in the trade as "False Body." It describes the tendency of some coating systems to exhibit a higher ("fake") viscosity when measured at low rates of shear. At high rates of shear a lower ("true") viscosity is measured. The Brookfield Viscosimeter is ideal for measuring these viscosities since it can be operated at different rotational speeds. With this instrument, viscosities (in Poises) are measured at the minimum and maximum rotational speeds. These usually are 2 vs 20 RPM or 6 vs 60 RPM depending on the model used. In either case the higher speed is 10X the lowest speed.

$$\text{Thixotropy Factor or Index} = \frac{\text{Poises at 2 or 6 RPM}}{\text{Poises at 20 or 60 RPM}}$$

The higher value denotes greater thixotropy.

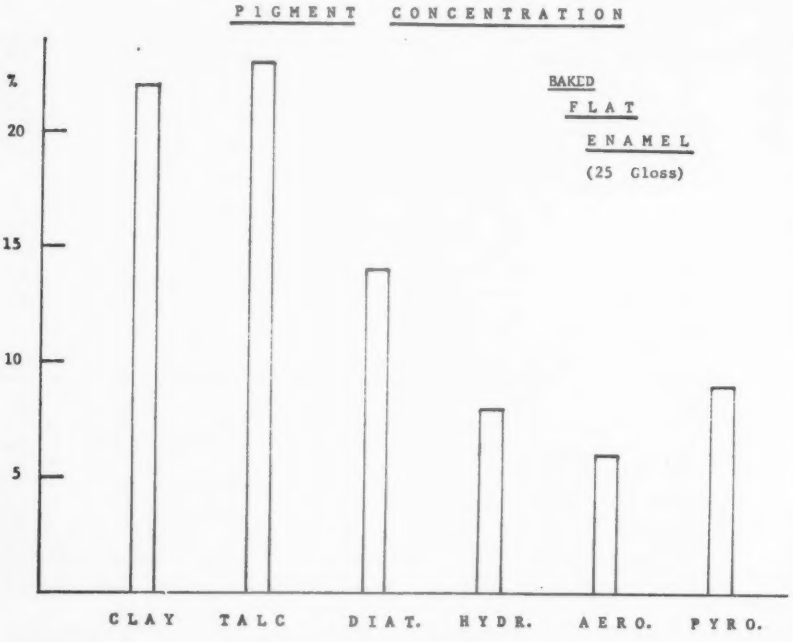


Figure 12

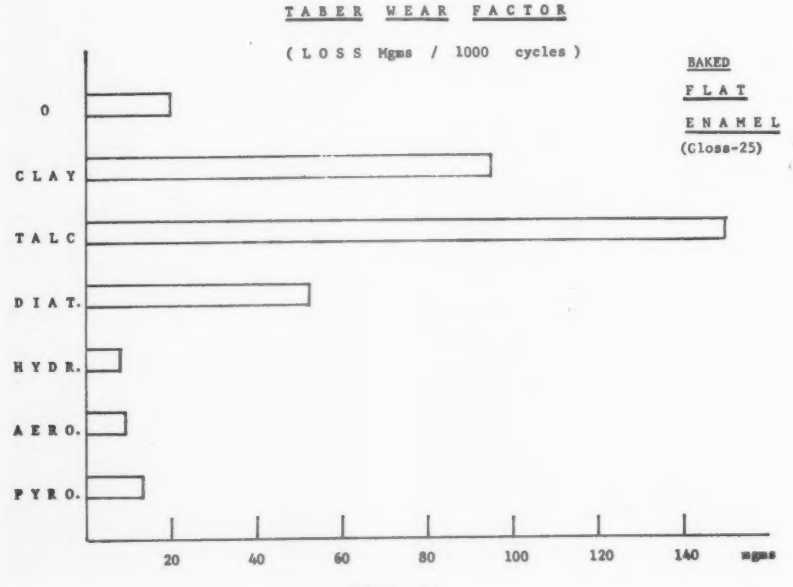


Figure 13

This paper is based on a talk presented at the New York Pigment Club, Dec. 8, 1960.

Photographs courtesy of Cabot Corporation, Boston, Mass., Davison Chemical Co., Div. W. R. Grace & Co., Baltimore, Md., Johns Manville Corp., Manville, New Jersey.

•

Canadian Interests Purchase Zinc Oxide Plant

The Pigment and Chemical Co., Ltd., announced the acquisition of Canadian Felling Zinc Oxide Ltd. of Milton, Ontario.

Pigment and Chemical, a privately owned Canadian company, has been a major chemical distributor for 34 years, with warehouse stocks in Quebec City, Montreal, Toronto and Vancouver, and plans to more fully utilize the strategic location of the Milton facility for additional distribution and manufacturing purposes.

Canadian Felling Zinc Oxide Ltd.'s organization will be fully integrated with Pigment and Chemical and both will operate as a single company under the name of the latter. No changes in manufacturing methods or personnel are contemplated.

Production and marketing of "Canfelzo" and "Felzodox" brands of powdered, densified, pelleted and leaded zinc oxides for the rubber, paint, ceramic, textile and chemical industries will continue as before.

•

Washburn & Purex Merge

Purex Corp., Ltd. and T. F. Washburn Co. of Chicago, announced the consolidation of Washburn with Purex through an exchange of stock. The transaction involves the exchange of one share of Purex preferred stock for each share of Washburn Class A or Class B preferred stock, and the exchange of .42 of a share of Purex common stock for each share of Washburn common stock.

The Washburn Co. manufactures and sells paint vehicles, varnishes and protective coatings, polymers, resins, and dryers. It will function as a wholly owned subsidiary of Purex and will continue operations under the direction of its present management.

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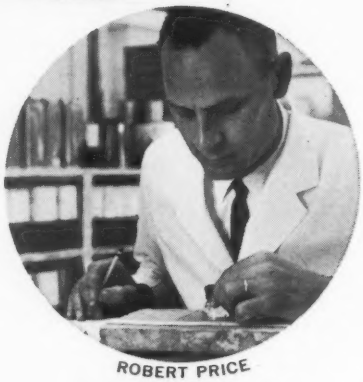
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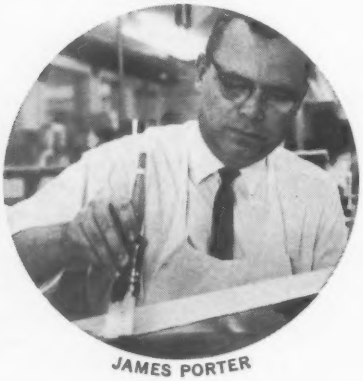
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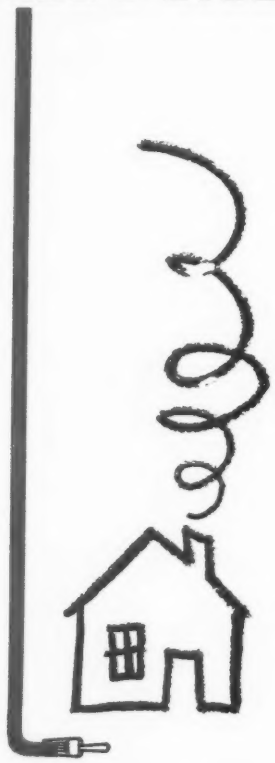

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	Clear Film	40% Pigment Volume Conc. Paint Film
A. Lytron 680	6.1	6.2
B. Acrylic Latex A	46.0	32.5
C. Acrylic Latex B	31.8	18.7
D. PVAC Copolymer A	43.0	75.0

Monsanto

*Specific MVT—Grams of water vapor passing through 100 square inches of film, 0.004 inches thick, per 24 hours. These data were obtained following the procedures of ASTM E-96-53T—Procedure E.

A Staff Report

ALKYD RESINS -- RECENT TRENDS

Part V

Polyhydric Alcohols--the Backbone of the Alkyd Molecule

THUS far under the heading of raw materials for the alkyd industry we have discussed various di- and polybasic acids and anhydrides as well as monobasic fatty acids, monobasic non-fatty acids, and oils. We have indicated further that there will probably not be many innovations in the area of oils and fatty acids in the years to come but that a large amount of research is continuing in the area of dibasic and more highly functional acids.

This latter statement applies also to the polyhydric alcohols which in a sense form the backbone of the alkyd molecule.

There are today a wide number of polyhydric alcohols available to the alkyd chemist. The one which is the most widely used is the trihydric material provided originally by nature, glycerol. Close on the heels of glycerol is pentaerythritol. Thereafter, many other materials have been proposed including trimethylolethane, trimethylolpropane, 1,2,6-hexanetriol, sorbitol, mannitol, and a variety of more exotic materials such as tetramethylolcyclohexanol. In addition to these, glycols are of value in certain specialty resins, particularly medium and short oil length alkyds where one wishes to decrease functionality. Ethylene glycol and propylene glycol are logical candidates here. Diethylene glycol is also used.

Types

Chemically, these various polyhydric alcohols fall into several distinct groups. In the first group is glycerol which is obtained from natural sources since all naturally occurring fats and oils are glycerol esters. In addition, however, glycerol is now synthesized by two procedures to be discussed later. In the second category are the polyhydric alcohols which result from the condensation of ketones or aldehydes with formaldehyde. The prime example of such compounds is pentaerythritol, which results from the condensation of formaldehyde with acetaldehyde. Pentaerythritol has several obvious and important advantages. First of all, all of the four hydroxyl groups are primary and thus esterify comparatively easily. Also, the equivalent weight per hydroxymethyl group is the lowest conceivable for a tetrahydric hydroxymethyl compound.

Utilizing this same type of condensation reaction, a variety of other polyhydric alcohols can be prepared. For example, the condensation of formaldehyde with propionaldehyde provides trimethylolethane whereas condensation between formaldehyde and butyraldehyde provides trimethylolpropane. Reactions with ketones yield polyfunctional materials also. Thus, the condensation of cyclohexanone with formaldehyde yields tetramethylolcyclohexanol.

The glycols referred to above come from still a third type of chemistry in which epoxide linkages are hydrolyzed. Thus ethylene oxide, reacted with water, yields ethylene glycol. Similarly propylene oxide yields propylene glycol.

Compounds like sorbitol and mannitol are prepared by the reduction of aldehyde sugars, primarily glucose.

Other carbohydrate derivatives in addition to mannitol and sorbitol have been proposed for use in alkyds. Among the most important of these is methyl alpha-D-glucoside.

Still another reaction of importance in polyhydric alcohol chemistry is that of etherification. Thus, diethylene glycol may be considered to be an ether of ethylene glycol which forms by the elimination of one molecule of water between two molecules of ethylene glycol. This same sort of chemistry is important in the formation of the higher pentaerythritols such as dipentaerythritol, tripentaerythritol, and polypentaerythritol. Here etherification takes place between two molecules of pentaerythritol to give one molecule of dipentaerythritol. As the process continues the tri-and higher polymers are formed. The higher pentaerythritols with their increased functionality provide routes for achieving properties such as higher viscosity, faster drying time and quicker dry.

Under the discussion of dibasic acids it was pointed

out that when the carboxylic groups are separated by several carbon atoms as they are in sebacic acid, their mobility influences the final alkyd by making it more fluid and more highly flexible. This same type of reasoning applies to polyhydric alcohols. Thus glycerol, pentaerythritol, and ethylene glycol, when reacted with phthalic anhydride, all give hard brittle materials. Diethylene glycol, on the other hand, which demonstrates a degree of mobility between the two hydroxyl groups provides, when reacted with phthalic anhydride, a viscous liquid. Concepts such as this one can be very valuable to the paint chemist as he attempts to build specific properties into his alkyd molecule.

Glycerol

As indicated previously, glycerol is the most important polyhydric alcohol, in terms of volume, which the protective coatings industry utilizes. In 1955, approximately 228 million pounds of glycerol were produced from both natural and synthetic sources. The alkyd industry utilized 30 per cent of this quantity or approximately 68 million pounds. During 1958, the alkyd industry consumed approximately 70 million pounds of glycerol.

To gain some insight into the importance of glycerol in alkyd production, one may point out that of the 382 million pounds of alkyds produced in 1954, 177 million pounds contained only glycerol whereas 205 million pounds contained some pentaerythritol. In the latter category of course are the alkyds which are based on a combination of glycerol and penetaerythritol.

As already indicated, glycerol comes from both natural and synthetic sources and in 1959 there was some tightening of glycerol supplies because soap production and fatty acid operations were curtailed. Both of these are sources of by-product glycerol. Thus, in 1959, an estimated 213 million pounds of glycerol were produced as compared with 239 million pounds in 1957.

There is very little question, however, but that in the long run glycerol will be in excellent supply largely because of the expanding sources of synthetic glycerol. Thus, late in 1959 it was announced that the Shell Chemical Corporation is building an additional synthetic glycerol unit. Although the alkyd industry is the largest user of glycerol, it is interesting to note where some of the other markets exist.

In addition to the alkyd industry, other portions of the protective coatings industry utilize glycerol. For example, in 1955, ten to twelve per cent of the total production of 228 million pounds found an outlet in the production of synthetic drying oils produced by esterification of the glycerol with unsaturated fatty acids. Ester gums or rosin esters of glycerol also use a fair amount of glycerol but this consumption is generally quoted in government statistics in the alkyd resin figure. The explosives and tobacco industries also use large amounts of glycerol and each of these account for about twelve per cent of the total produced.

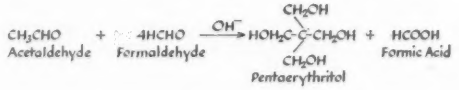
Glycerol consumption apparently hit a peak in 1957 when 248 million pounds were utilized. Production figures for that year incidentally indicated that only 238 million pounds were produced, due in large measure to cutbacks in production of by-product natural glycerol. It is estimated that in 1957 approximately 100 million pounds of glycerol were produced synthetically, 25 million pounds were imported, and the remainder came from domestic natural sources.

Currently two routes are available for the production of synthetic glycerol. One of these depends on the chlorination of propylene to yield allyl chloride which on treatment with hypochlorous acid yields glycerol dichlorohydrin. Treatment of the dichlorohydrin with sodium hydroxide effects hydrolysis of the chlorine atoms to provide glycerol. A new process for glycerol production involves the use of acrolein which is prepared from propylene. The acrolein is converted to glycerol in a series of reactions which involve the use of hydrogen peroxide to hydroxylate the double bond.

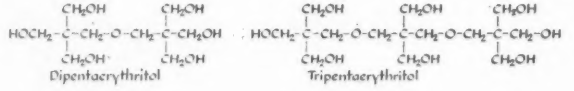
As indicated above, the supplies of glycerol promise to be excellent in the years to come and there is little reason to feel that glycerol will not maintain its dominant position in alkyd formulation.

Pentaerythritol

The chemistry of pentaerythritol has been mentioned briefly above and may be illustrated further by the following equation.



The removal of water between two or more molecules of pentaerythritol produces di- and tripentaerythritol, molecules which have the following structure:



The pentaerythritol industry is one in which large over-capacity exists. Thus, sales for 1958 have been estimated at around 57 million pounds as compared to a 140 million pound industry capacity. Actually, since 1950, 70 million pounds of productive capacity have been added whereas demand for the product has actually decreased somewhat. There are currently nine suppliers of the product including two in Canada. These include Heyden Newport, Hercules Powder Company, Trojan Powder Company, Reichhold Chemicals, Delaware Chemicals, Commercial Solvents, and Gulf Oil. The two Canadian companies are St. Maurice Chemicals and Canadian Chemicals. The largest capacity in this country is claimed by Heyden Newport who have the ability to produce approximately 51 million pounds annually. Second in line is Hercules Powder Company with a productive capacity of 44 million pounds. Actually, pentaerythritol consumption since 1943 has grown at

quite an astronomical rate, since it has quintupled in the period from 1943 to 1953. Thus in 1943 domestic output was ten million pounds whereas in 1953 it was 56 million pounds. Thereafter, however, the growth decreased and the record consumption appears to have been achieved in 1955 when 61 million pounds were utilized. It is obvious then that pentaerythritol capacity is going to be adequate for many years to come. Whether the growth picture of the early days will ever be resumed is in large measure dependent on whether additional applications for the product will develop. The high polymer technique for alkyd production is one technological advance which may increase the need for pentaerythritol in alkyd production.

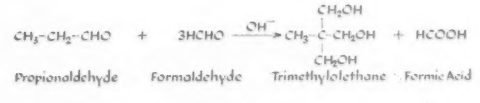
Currently, almost 95 per cent of the pentaerythritol produced is utilized by the protective coatings industry. It is interesting that the other use for pentaerythritol is in the form of the tetranitrate as an explosive. This picture may change, however, because of advances like a pentaerythritol-based resin recently announced which will find applications outside of the protective coatings industry.

The overcapacity for pentaerythritol production has brought about improved quality of the product and decreased prices. Early in 1958 the cost of technical pentaerythritol dropped nearly eight per cent from 32 cents per pound to 29½ cents per pound in carloads. From a technological point of view, products are now available with hydroxyl contents which approach the theoretical values and with negligible amounts of ash and an absence of fine dust.

Some of the important considerations in the preparation of pentaerythritol-containing alkyds, particularly those involving the use of oils, have been discussed in an article by Kraft, Metz and Roberts (*Paint and Varnish Production*, July, 1957, p. 29). Among the conclusions reached are several relating to procedures for obtaining low color and short filtration time. The point is made that color is affected by such factors as alcoholysis catalyst concentration, alcoholysis temperature, and type of alcoholysis catalyst in relation to the oil used.

Trimethylolethane

Trimethylolethane, as indicated above, is synthesized by the condensation of propionaldehyde with formaldehyde according to the following equation:



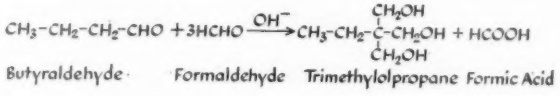
It is obvious from the formula that one has here a material resembling glycerol except that there is an alkyl group which should lead to greater compatibility. Also, all of the hydroxyl groups are primary for which reason faster reaction can be expected.

Trimethylolethane is said to improve the high temperature resistance of alkyds based on it. Thus, one of the areas in which the material has found application is in the preparation of short oil alkyds for combination with melamine resins for baking finishes. Actually, one of the claims of superiority for trimethylolethane is that less of the melamine resin is required in such finishes. A typical formulation might include 34 parts of trimethylolethane, 25 parts of lauric acid and 41 parts of phthalic anhydride.

Another typical formulation containing soy fatty acids might include 30 parts of trimethylolethane, 34 parts of soy fatty acids, and 36 parts of phthalic anhydride. Such a product will demonstrate a viscosity of X as a 50 per cent solution in xylol. A corresponding product formulated with glycerol instead of trimethylolethane will demonstrate a viscosity of W under the same conditions. The trimethylolethane resin will have getter alkali resistance and will show a hardness of 32 on the Rocker scale after 45 minutes at 175°C. The glycerol resin, on the other hand, will have a hardness of sixteen.

Trimethylolpropane

The relationship of trimethylolpropane to trimethylolethane may be shown by the following equation.



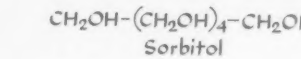
Virtues claimed for trimethylolpropane are very similar to those described above for trimethylolethane. Thus, one of the suppliers of trimethylolpropane indicates in his brochure that the use of this polyhydric alcohol in alkyd resin formulation will lead to improved hardness, color retention, chemical resistance, and adhesion. A typical formulation for a medium oil length alkyd involves 19 parts of trimethylolpropane, 51 parts of alkali-refined soybean oil, and 30 parts of phthalic anhydride. This product is said to achieve set-to-touch time somewhat faster than a corresponding glycerol alkyd and to demonstrate considerably better alkali resistance.

A typical short oil length alkyd formulation will contain 26 parts of trimethylolpropane, 39 parts of alkali-refined soybean oil, and 35 parts of phthalic anhydride. In the preparation of such an alkyd, the alcoholysis time is said to be faster than it is when glycerol is used and again better alkali resistance is observed. Both trimethylolethane and trimethylolpropane are more expensive than glycerol and this, of course, has inhibited their acceptance. Also, the equivalent weight per hydroxyl group is greater which contributes to an overall higher cost. Both trimethylolethane and trimethylolpropane are discussed briefly in an article in *Canadian Paint and Varnish Production* (September, 1958, p. 40).

Other Polyhydric Alcohols

A variety of other polyhydric alcohols have been proposed from time to time for use by the alkyd and protective coatings industries. Sorbitol, for example, which is the hexahydric sugar alcohol which results from the catalytic reduction of glucose, as well as its isomer, mannitol, has been explored extensively in

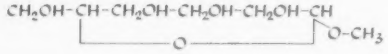
the alkyd field. Because of its source, sorbitol is basically inexpensive. It has the following structure:



Sorbitol

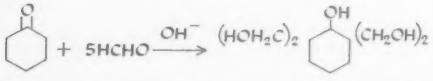
As the formula indicates, there are two primary hydroxyl groups and four secondary ones. The molecule, however, is relatively unstable and water tends to split out to form internal ethers between two or more hydroxyl groups under the influence of heat. Thus, esterification is somewhat difficult and if sorbitol is used it must be used in combination with other polyols such as glycerol. Because of the instability of the secondary hydroxyl groups, only 3.5 to four of the six hydroxyls are normally available for esterification.

Another product derived from a carbohydrate source is methyl-alpha-D-glucocide which has the following structure:



This material is also basically inexpensive and is somewhat more stable than sorbitol (Gibbons and Janke, *Journal of American Oil Chemists' Society*, **29**, 467 (1952).

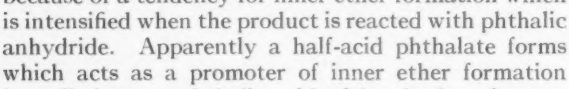
Among the ketone formaldehyde condensation products which have been proposed for use in alkyds is 2,2,6,6-tetramethylolcyclohexanol which may be prepared as the following equation indicates.



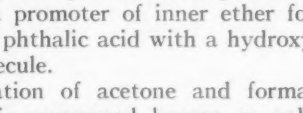
Cyclohexanone Formaldehyde 2,2,6,6-Tetramethylolcyclohexanol

Approximately 4.5 of the five hydroxyl groups in this molecule may be readily esterified [Wittcoff, *Journal of American Chemists' Society*, **26**, 157 (1949)]. Although the product may be used in the preparation of reconstituted oils, its application to alkyds is limited because of a tendency for inner ether formation which is intensified when the product is reacted with phthalic anhydride. Apparently a half-acid phthalate forms which acts as a promoter of inner ether formation by splitting out phthalic acid with a hydroxyl group in the same molecule.

The condensation of acetone and formaldehyde leads to a cyclic compound known as anhydroenneaheptitol, as the following equations indicate.



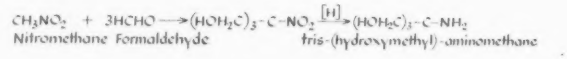
Acetone Formaldehyde



Anhydroenneaheptitol

This product too has been promoted as an ingredient of alkyds but is probably more unstable even than the cyclohexanone-formaldehyde condensation product described above.

An interesting compound which has aroused some interest in the alkyd field is tris-(hydroxymethyl)-aminomethane. This product results from the condensation of formaldehyde with nitromethane followed by the reduction of the nitro group. These series of reactions are indicated by the following equations:

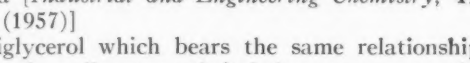


Nitromethane Formaldehyde tris-(hydroxymethyl)-aminomethane

This molecule is basically tetrahydric since both the hydroxyl and the amino groups may react with either fatty acids or dibasic acids such as phthalic anhydride.

Another interesting material which has been suggested for exploration by the alkyd industry is 1,2,6-hexanetriol. This is made by the dimerization of acrolein followed by hydrolysis and hydrogenation. As might be expected because of the great ease of rotation of the hydroxyl groups in a molecule like hexanetriol, alkyds formulated with it provide soft, highly flexible films. This higher degree of flexibility makes possible the formulation of short oil alkyds based on hexanetriol with very high contents of melamine or urea-formaldehyde resins. Such combinations are said to have excellent retention of flexibility, high impact resistance, and excellent color retention on aging, heat aging or overbaking. On outdoor exposure, alkyds made with this polyhydric alcohol are said to provide films with better gloss retention and greater resistance to cracking and chalking. The experimental work supporting these conclusions has been described by Tess, Harline and Mika [*Industrial and Engineering Chemistry*, **49**, 3. 15A (1957)]

Diglycerol which bears the same relationship to glycerol as dipentaerythritol does to pentaerythritol has also been projected for use in alkyds. Its formula may be indicated as follows:

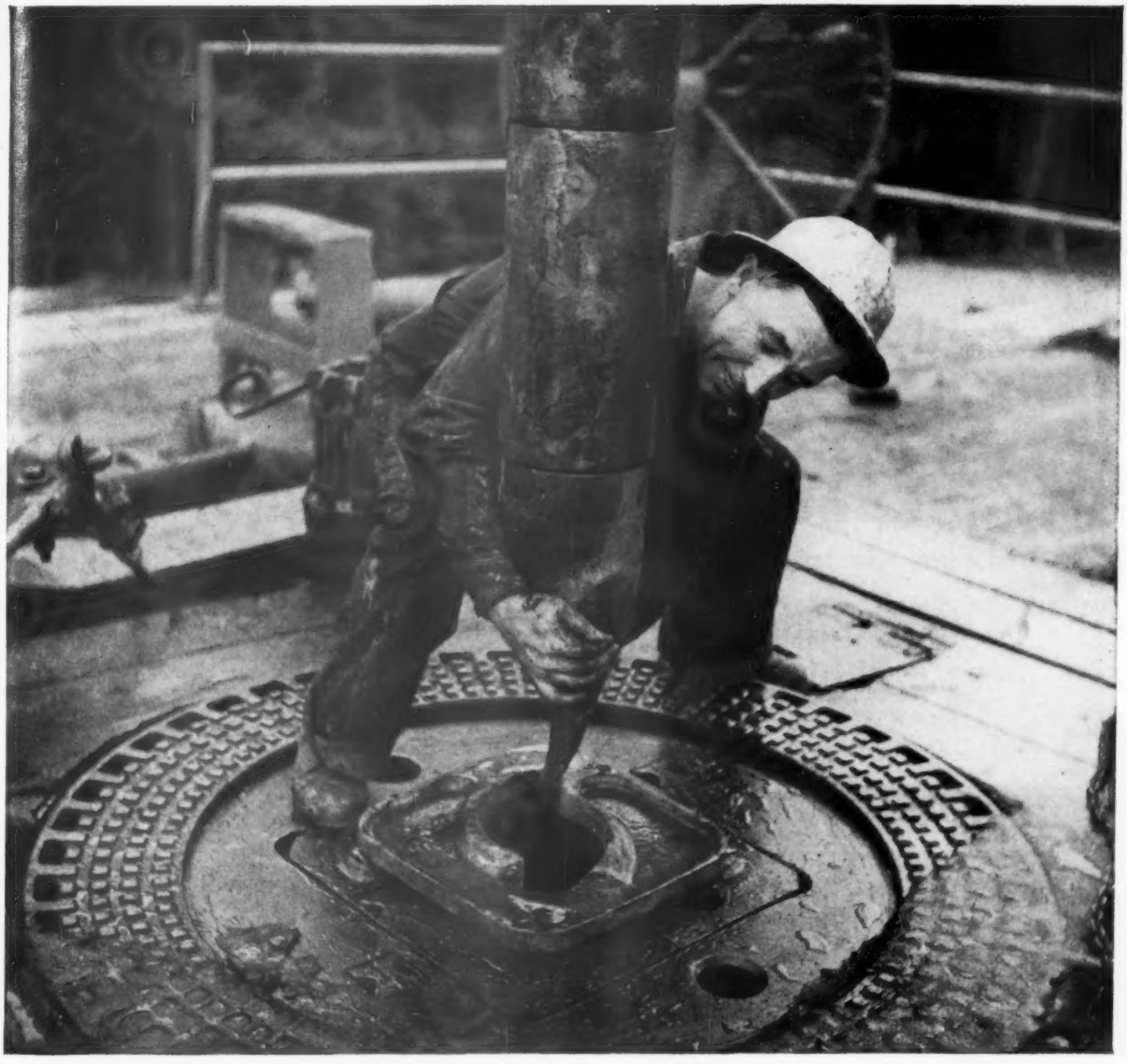


Diglycerol

Work carried out on the application of pure diglycerol to the problems of the protective coatings industry (Northwestern Club, *Official Digest*, November, 1950, p. 827) indicates that this material could have important applications if it were available commercially. Although the product has been made by several interesting laboratory procedures [Wittcoff, Roach, and Miller, *Journal of American Chemical Society*, **69**, 2655 (1947); 71, 2666 (1949)], it has never been produced commercially.

Diglycerol is of course a constituent of the polyglycerol mixture which forms when glycerol is heated in the presence of an alkaline catalyst.

(*Turn to page 88*)



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max.	0.807
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Non-volatile Matter (mg/100 ml) max.	2.0
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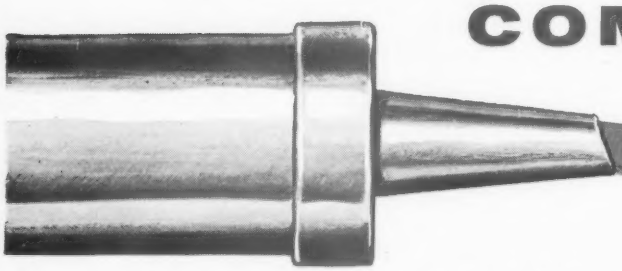

102G

Ingredients	lbs.
Blown Soya (Z2)	246
Indopol H-100	112
Soya Fatty Acids	16
6% Co. Drier	4
Mineral Spirits	60
Atomite	800
INTERNATIONAL FIBRE	200
	1438

106D

Ingredients	lbs.
Raw Selectol	75
Aged Linseed Oil	75
Atomite	350
Putty Filler	350
INTERNATIONAL FIBRE	150
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BLISTERING OF PAINTED STEEL

Part II

The Dia Phenomenon and its effect in the blistering of steel coated with pigmented and unpigmented paint systems.

By
J. A. W. Van Laar*

The Dia-Phenomenon With Other Paint Systems

Pigmented Systems

Plasticized Urea resin—TiO_2 Rutile Painted Panels. Mildly sandblasted, are coated with the top coat of the Standard Paint System. After 4 days in the Fresh Water Immersion Test, some small blisters appear on the Dia side of a scratch: the Blister Dia Phenomenon. This paint is prone to severe blistering, so that the Dia Phenomenon is not persistent. Epoxy ester-Urea resin-TiO_2 Rutile Paint. An extreme case is shown in the panels of Figures 14 and 15. The primer applied, an Epoxy ester-Urea resin-TiO_2 composition, is strongly water resistant and blister proof.

The scratched top coat has a Urea resin-Dehydrated Castor Oil Alkyd as a vehicle and TiO_2 rutile and some carbon black as a pigment. The other side of the panel bears the topcoat of the standard paint system, a Plasticized Urea Resin with TiO_2 Rutile.

After 16 Months' Fresh Water Immersion Test, no general blisters develop, but along the Dia side of the scratches, we observe two rough rows of blisters, 1-2 mm large, and smaller ones of a diameter of 0.2-0.3 mm, distributed over a width of 8-10 mm (the same as the Dia side.) This means, that the impulse to form blisters in general is not sufficient; but preferential blisters develop. Also, the smaller blisters may be due to atomic hydrogen, emerging from the steel at the Dia side, referred to reverse Dia Phenomenon. Some rust was found under the blister.

Thus it is clear that different mechanisms are at work. These mechanisms are of a different magnitude. Although there is no principal difference, the effect of the different rates of speed with different paint systems and treatments may give rise to seemingly different results.

Unpigmented Systems of Different Water Permeability.

In order to be able to observe more directly the processes under the film, a series of four lacquers is applied on mildly sandblasted, cold-rolled steel. Included is a fifth lacquer, applied on sanded cold-rolled steel.

The vehicles are:

	Panel no.
Resins of Epoxyester-Urea resin I	226/1
Resins of Epoxy ester Coconut fatty acid ester-Urea resin I	223/2
Alkyd Dehydr. Castor Oil-Different Urea resin II	225/2
Alkyd from Castor Oil-Nitrocellulose	224/1
Alkyd Dehydr. Castor Oil-different Urea resin	1

Figs. 16-25 show the sandblasted panels with the first four lacquers after 19 days' Fresh Water Immersion test.

With panel 226/1 no blistering occurs, consequently the Blister Dia Phenomenon cannot develop, but corrosion is stimulated at the Dia spot of the uncovered parts, where we see a brownish discoloration due to some $Fe(OH)_3$.

Panel 223/2 shows no blistering in general, but some along the bare spots and very few at their Dia sides. The development of rust is stronger in accordance with the somewhat greater permeability of this coating.

On panel 225/2 there is a rather strong development of numerous, large and small blisters, and of underrust in small spots. Both blisters and rust spots are generally distributed, but at the Dia side of the bare parts there are less blisters.

Here we see also more rusty spots but no continuous discoloration. On the part above water where the relative humidity will be somewhat under 100%, a continuous layer of rust has developed.

*N. V. Philips' Gloeilampenfabriken, Eindhoven, Netherlands.

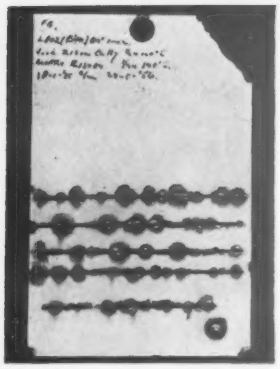


Figure 14. A clear case of stimulated blistering along the Dia side of the scratches together with a lasting reverse Dia Phenomenon.

Figure 15. Blistering along the Dia side of the scratches together with a lasting reverse Dia Phenomenon. The larger blisters lie in 2 rows along the Dia spot of the panel edges and along each scratch, as can be shown by re-drawing.

Figure 16. Corrosion Dia Phenomenon with a highly water resistant lacquer. No blister formation.

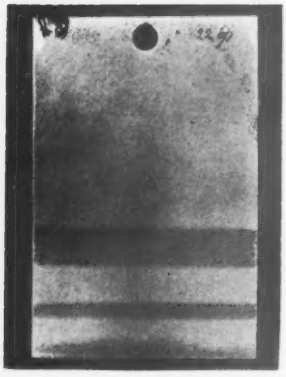


Figure 17. Corrosion Dia Phenomenon. No blister formation but corrosion occurs on the Dia side of the bare spots.

Figure 18. Corrosion and slight Blister Dia Phenomenon with a lacquer of good water resistance. Slight blistering along bare spots and edges.

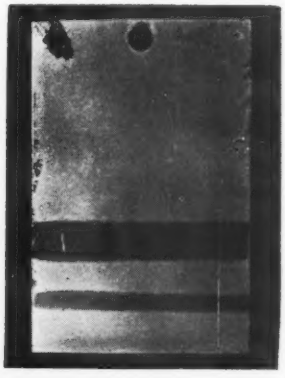


Figure 19. Corrosion and slight Blister Dia Phenomenon. More corrosion than Fig. 17. Very slight blistering along the Dia side of the bare spots.

Figure 20. Slight Blister and Corrosion Dia Phenomenon with a lacquer of low water resistance and good adhesion. Medium general blistering, strong spot corrosion. Corrosion of nuclei all over the panel. Very strong corrosion on areas above water.

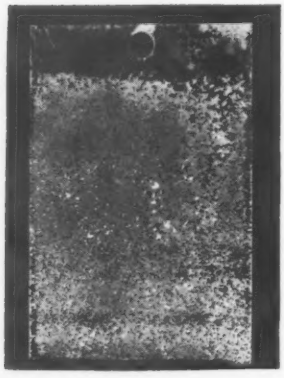


Figure 21. Slight Blister and slight Corrosion Dia Phenomenon with a lacquer of low water resistance but good adhesion.

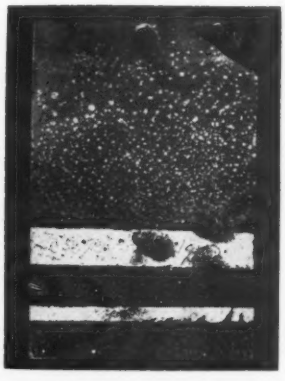


Figure 22. Plain Corrosion Dia Phenomenon, no Blister Dia Phenomenon, with a lacquer of medium water resistance and medium adhesion. Strong general blistering, less spot corrosion than Figures 20-21. Corrosion nuclei all over the panel.

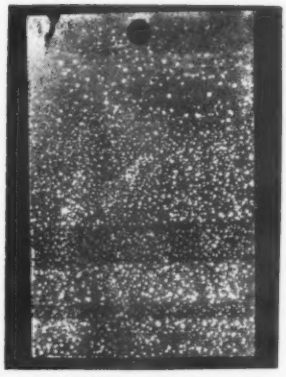


Figure 23. Plain Corrosion Dia Phenomenon, no Blister Dia Phenomenon, with a lacquer of medium water resistance and medium adhesion Dia side (Front side see Fig. 22).

Figure 24. Slight Blister and Corrosion Dia Phenomenon with a lacquer of low water resistance and good adhesion. No general blistering, no spot corrosion. No corrosion nuclei.

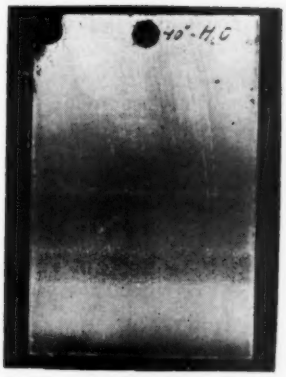


Figure 25. Slight Blister and Corrosion Dia Phenomenon with a lacquer of low water resistance and good adhesion. No general blistering, no spot corrosion. No corrosion nuclei.

Figure 26. The Corrosion Dia Phenomenon with a lacquer in Rust Test No. 1. General light-brown corrosion spots. Darker filiform underrust from 6 scratches.

Figure 27. The Corrosion Dia Phenomenon with a lacquer in Rust Test No. 1. General light-brown corrosion spots, but more dense at the Dia side of the scratches.

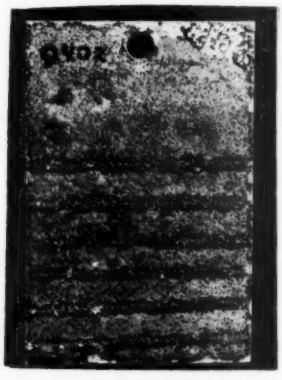


Figure 28. The Corrosion Dia Phenomenon with a lacquer in the Rust Test No. 1. Smaller light brown and darker corrosion spots distributed generally. Dense underrust, very dark, from 6 scratches (Dia side see Fig. 29).

On panel 224/1 still more blisters but not the small ones seen on panel 225/2 occur. The white spots are bare metal where the lacquer has loosened completely. There is never a coincidence of a former blister and a rusty spot. There is less rust than on panel 225/2, but on the Dia side of the bare spots there is (besides some more rust than in general) a continuous discoloration similar to that of panels 226/1 and 223/2.

The adhesion of the air-drying nitro-alkyd lacquer of panel 224/1, according to the larger size of blisters, seems smaller than that of the baking urea-alkyd lacquer of panel 225/2, but the water resistance seems larger in view of their smaller size of them and the similarity of the discoloration with those of panels 226/1 and 223/2.

Fig. 24 and 25 show a Fresh Water Immersion Test of 33 days with the lacquer system mentioned lastly. The metal was sanded (waterproof no. 320) and trichloroethylene vapour phase degreased.

With the Standard Paint System we had no Dia phenomenon on this substrate. Here we see a slight development of rust and a whitening of the paint, perhaps from temporary lifting by atomic hydrogen. It seems that there is less corrosion nuclei under the lacquer than on panel 225/2 and 224/1. Thus a more critical attitude towards pretreatment seems desirable. A certain amount of electrolyte under the lacquer film on the two panels lastly mentioned would account for their stronger corrosion as well as blistering, compared to panel no. 1.

Figure 29. The Corrosion Dia Phenomenon with a lacquer in Rust Test No. 1. On Dia side of scratches less light-brown spots, more dark-brown larger spots.

Conclusion: No blistering with the two water resistant films, (Fig. 26-29), therefore no Blister Dia Phenomenon within the time (19 days). Very plain Rust Dia Phenomenon. Medium strong blistering in Figs. 20-23, therefore slight to no Blister Dia Phenomenon. These results obtained on Mildly (wet) Sandblasted Steel differ from those of Figs. 24-25. Although the lacquer base is very similar to that of Figs. 20-21, no general underrust is visible. However, the

manifestation in Figs. 24-25 of the Dia Phenomenon is similar to Figs. 20-21: Slight Corrosion and Blister Phenomena.

The Dia Phenomenon in Rust Test No. 1

Cold-rolled steel panels, vapour degreased in trichloroethylene are covered with the same lacquer as is applied to panel 225/2: Dehydrated Castor oil alkyd-urea resin. The panel is then scratched six times and subjected to the Rust test No. 1. Underrust develops in a direction perpendicular to the scratches. The difference with the Fresh Water Immersion Test is not only the absence of blistering unless the relative humidity is over 90%, but also the much larger area over which the rust spreads. Figs. 26 and 27 show the front and the back of panel No. 9410 after 8 days of exposure. In Fig. 26 on the front of the panel we see a general tendency to rust all over the panel. Light brown rusty spots over which the lacquer film is not lifted visibly occupy more than 50% of the surface in general. But along the scratches the occupation is complete because here the underrust from the scratch is added, which has a deepbrown color. In Fig. 27 it is seen that at the Dia side of the panel the development of rust is also complete at the back of the scratches with some darkening. Thus there is a stimulation of rust through the panel.

Fig. 28 represents panel 9402 after 13 days. Here we see two kinds of rusty spots, a larger darkish brown type, which is in fact a very flat blister, diameter 0.8-1.5 mm, and a smaller type of light brown flat rust spot as on the foregoing pictures, diameter 0.2-0.3 mm. Both types cover about 90% of the scratched side at random, but Fig. 29 shows more deep-brown flat blisters at the Dia side of the scratch and more small light-brown rusty spots between the Dia side.

Here, the Corrosion Dia Phenomenon apparently consists of the extra stimulation of corrosion through the metal in an already corrosive environment, which also causes blistering.

The difference in appearance between the two panels proves that the reproducibility of the metal surface and the environment is not always kept in hand fully. It is suspected that the wet sandblasting sometimes leaves remaining electrolytes on the metal surface. Further, the temperature distribution and consequently the relative humidity was not always the same. This has been improved so that rust development under the lacquer is no longer seen. With the panel 9402 (Figs. 28 and 29) the relative humidity was probably near to 100%.

However, the experiments show that the Dia Phenomenon is not necessarily linked to fresh water immersion and moreover circumstances in practice are sometimes far from ideal.

Maybe the lacquer itself contains a corrosion stimulating substance, for instance an acid catalyst, for example the promotor used in the condensation of the urea resin.

Electrolysis Experiments

The foregoing experiments have shown that corrosion at the scratches of a completely coated panel coincides with the Dia Phenomenon i.e. the suppression of blistering and the stimulation of corrosion at the other side.

Is it the corrosion or the hydrogen generated by it that gives the Dia Phenomenon?

It is thought that the voids in the metal that result from the corrosion one one side of the panel will give rise to local mechanical stresses and consequently a different electrochemical potential at the back.

To decide this it was experimentally determined that either corrosion or hydrogen development could be made to take place at will and not simultaneously as in the cases described as spontaneous corrosion.

Electrolysis experiments with a few coating systems show that atomic hydrogen is produced which gives rise to the Blister and the Corrosion Dia Phenomenon.

It is estimated that the speed with which the phenomenon appears is of the order of 3 to 10 faster when electrolysis is applied after three days the Dia Phenomenon sets in. For spontaneous corrosion it takes 33 days to develop the Dia Phenomenon. Also, it is interesting to note that the blistering of a paint system is an electrolysis experiment will take place after 6 days compared to a year if the same system is immersed in fresh water.

Details on panel preparation, paint systems, etc.

Fig. 14
Panel No. 12601. Front (Scratched) side. (Dia side see Fig. 15)
Panel: Cold-rolled steel, 0.1 x 9 x 14 cm.
Pretreatment: Mildly (wet) Sandblasting.
Paint System: Aethoxylin-Urea resin-TiO- Rutile primer
D.C.O. Alkyd-Urea resin-TiO- Rutile topcoat.
Scratches: All made before Test
Test: Fresh Water Immersion Test.
Picture taken: After 16 months of testing.

Fig. 15
Panel No. 12601. Dia side (Front side see Fig. 14)
Details: See Fig. 14

Fig. 16
Panel No. 226/1. Front side of lacquered Panel, partly masked. (Dia side see Fig. 17)
Panel: Cold-rolled steel, 0.1 x 9 x 14 cm.
Pretreatment: Mildly (wet) Sandblasting.
Lacquer Base: Aethoxylin-Urea resin.
Bare spots: Masking tape applied.
Test: Fresh Water Immersion Test.
Picture taken: After 19 days of testing.

Fig. 17
Panel No. 226/1. Dia side (Front side see Fig. 16.)
Details: See Fig. 16.

Fig. 18
Panel No. 223/2. Front side of lacquered Panel, partly masked. (Dia side see Fig. 19.)
Panel: Cold-rolled steel, 0.1 x 9 x 14 cm.
Pretreatment: Mildly (wet) Sandblasting.
Lacquer Base: Aethoxylin-Coconut Oil fatty acid ester.
Bare Spots: Masking tape applied.
Test: Fresh Water Immersion test.
Picture taken: After 19 days of testing.

Fig. 19
Panel No. 223/2. Dia Side (Front side see Fig. 18).
Details: See Fig. 18.

Fig. 20
Panel No. 225/2. Front Side. (Dia side see Fig. 21.)
Panel: Cold-rolled steel, 0.1 x 9 x 14 cm.
Pretreatment: Mildly (wet) Sandblasting.
Lacquer Base: Dehydrated Castor oil Alkyd—Urea resin.
Bare spots: Masked.
Test: Fresh Water Immersion test.
Picture taken: After 19 days of testing.

Fig. 21
Dia side. (Front side see Fig. 20.)
Details: See Fig. 20.

Fig. 22
Panel No. 224/1. Front side. (Dia side see Fig. 23)
Panel: Cold-rolled Steel, 0.1 x 9 x 14 cm.
Pretreatment: Mildly (wet) Sandblasting.
Lacquer Base: Castor oil Alkyd-Nitrocellulose.
Bare Spots: Masked.
Test: Fresh Water Immersion Test.
Picture taken: After 19 days of testing.

Fig. 23
Dia side. (Front side see Fig. 22)
Details: See Fig. 22.

Fig. 24
Panel No. 1. Front side. (Dia side see Fig. 25). Compare with Figs. 16-23.
Panel: Cold-rolled Steel, 0.1 x 9 x 14 cm.
Pretreatment: Dry Sanded with Water proof no. 320,
Trichloroethylene Vapour Degreased.
Lacquer Base: Dehydrated Castor oil Alkyd-Urea resin.
Bare Spots: Masked.
Test: Fresh Water Immersion test.
Picture taken: After 33 days of testing.

Fig. 25
Panel No. 1. Dia side. (Front Side see Fig. 24)
Details: See Fig. 24.

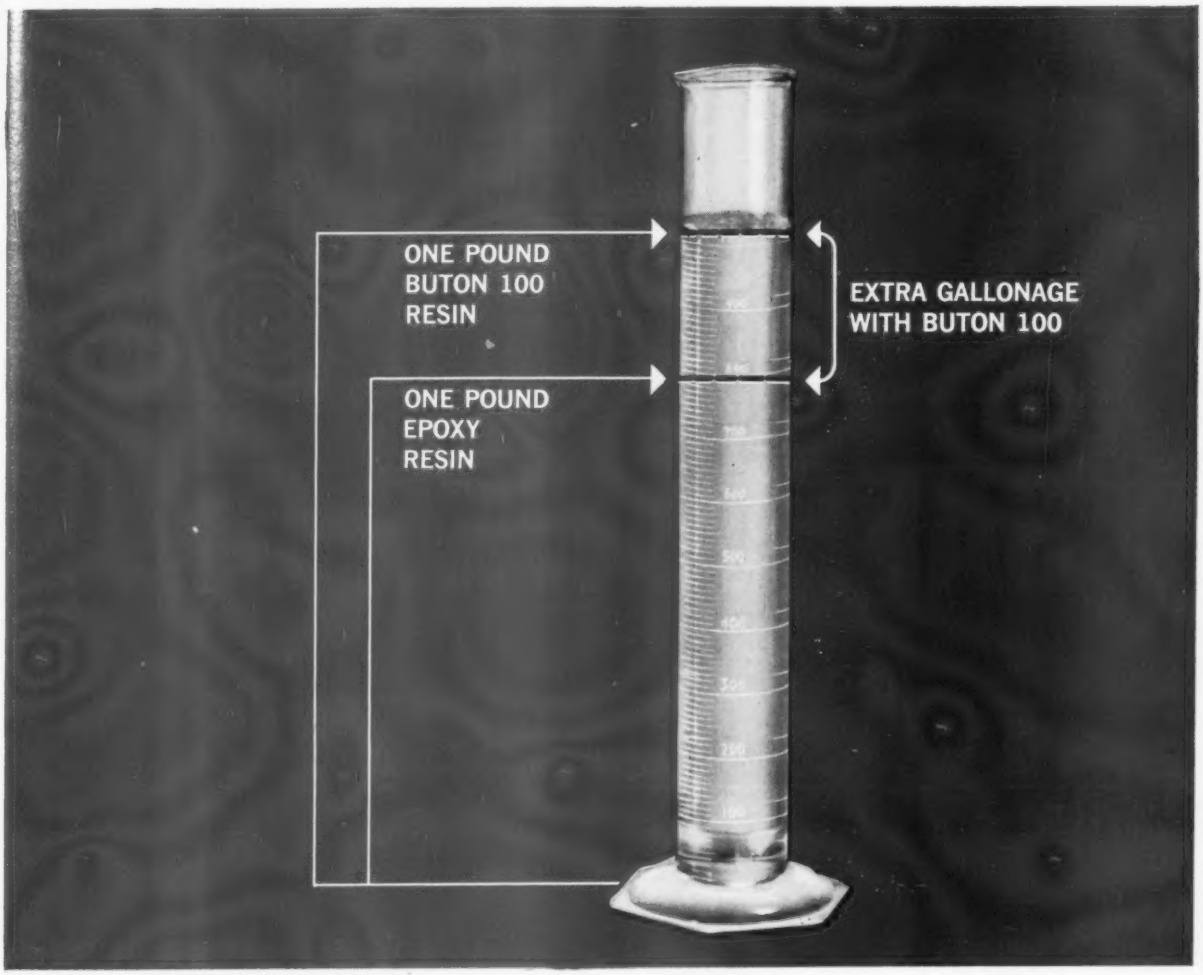
Fig. 26
Panel No. 9410. Front side of scratched panel. (Dia side see Fig. 27.)
Panel: Cold-rolled Steel, 0.1 x 9 x 14 cm.
Pretreatment: Trichloroethylene Vapour Phase Degreased.
Lacquer Base: Dehydrated Castor oil Alkyd-Urea resin.
Picture taken: After 8 days of testing.

Fig. 27
Panel No. 9410. Dia side of scratched panel. (Front side see Fig. 26)
Details: See Fig. 26.

Fig. 28
Panel: Cold-rolled Steel, 0.1 x 9 x 14 cm.
Pretreatment: Trichloroethylene Vapour Phase Degreased.
Lacquer Base: Dehydrated Castor oil Alkyd-Urea resin.
Test: Rust test no. 1.
Picture taken: After 13 days of testing.

Fig. 29
Panel No. 9402. Dia side. (Front Side see Fig. 28)
Details: See Fig. 28.

What's News in Enjay Resins...



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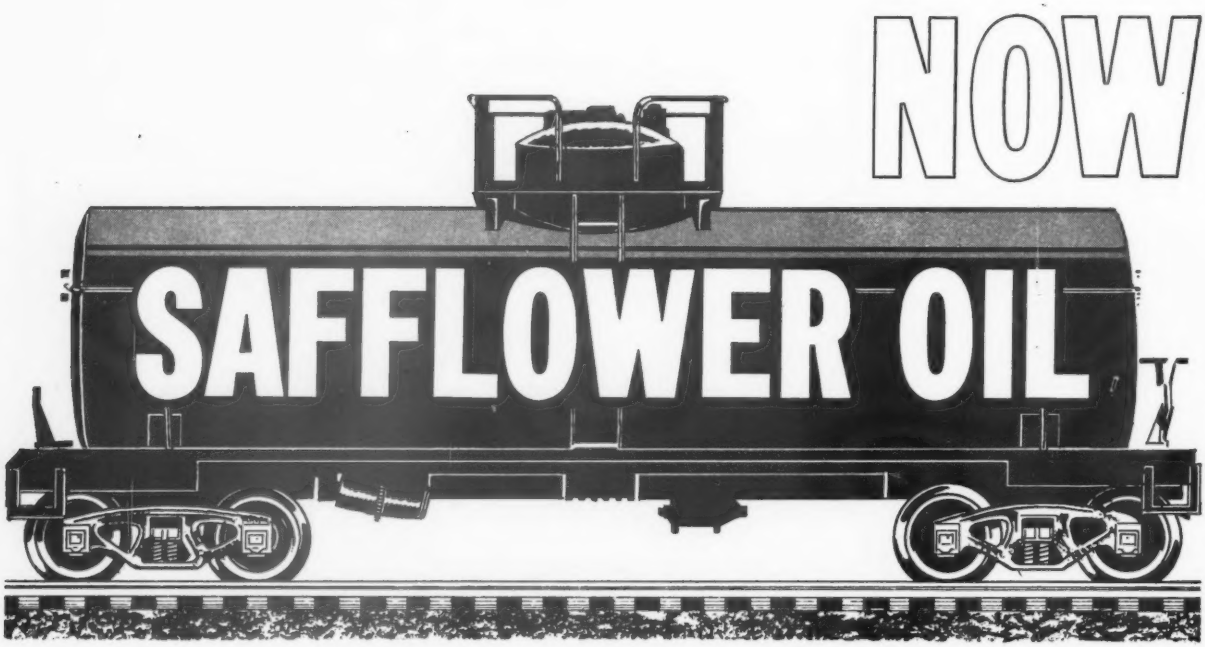

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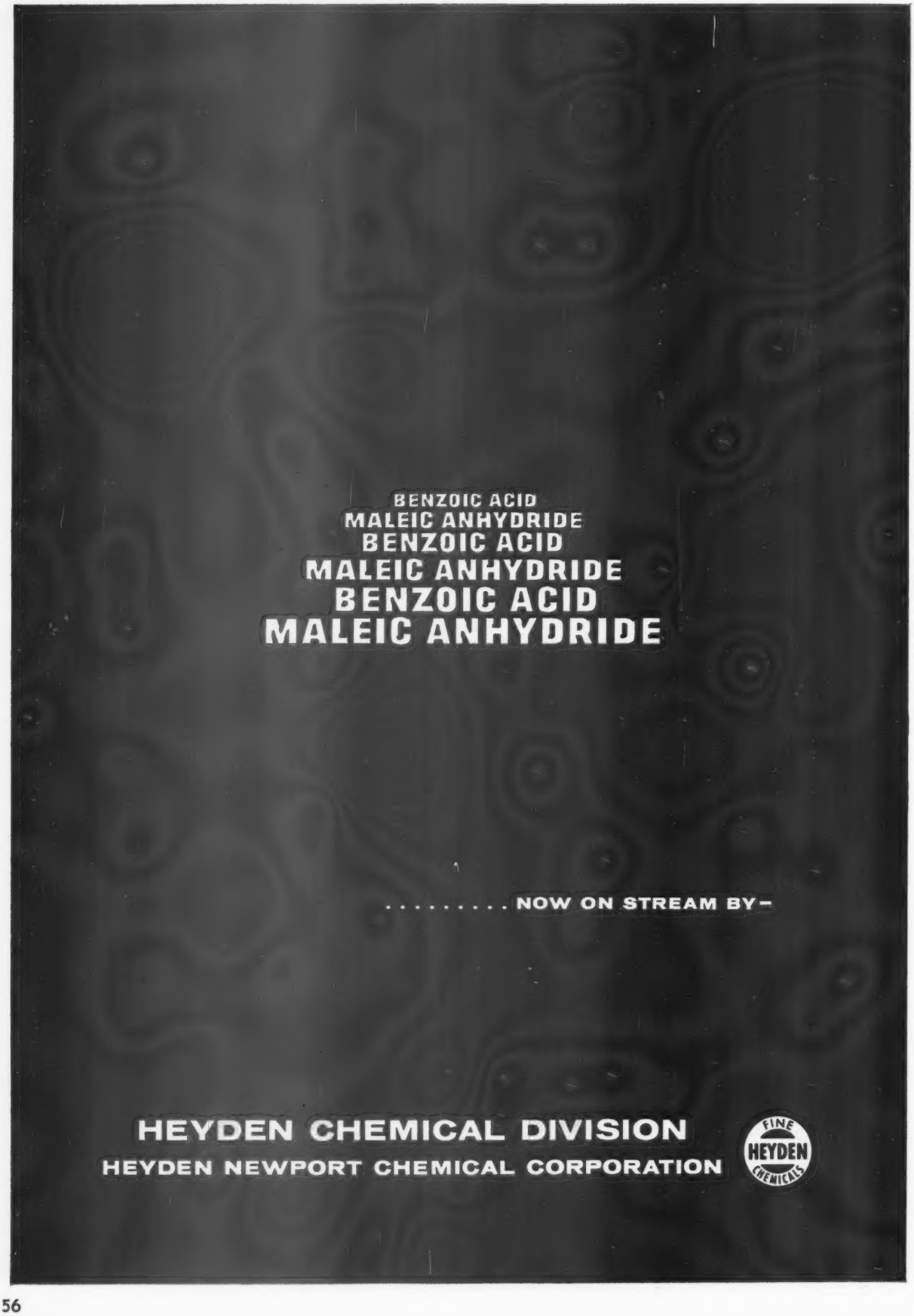
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PVP COVER STORY

Color Flexibility Boosts Sapolin Sales

E. A. Eckart, Jr., of Sapolin Paints is shown inspecting the new manually operated custom blender and full range color charts.

SAPOLIN PAINTS INC., (NYC), which has been beautifying American homes since 1883, finds that to keep competitive, you must change with the times.

E. A. Eckart Jr., Assistant to the President at Sapolin, believes in merchandising, merchandising, and more merchandising, to sell paints. "The old days when paint automatically moved off the shelves are gone forever," Mr. Eckart stated recently. "With competition from other wall surfaces continuing to grow, the paint manufacturer and dealer must work closely together."

How can the paint manufacturer specifically assist the retailer to realize greater and more consistent profits?

"By analyzing his market and giving him what will sell fast and at a profit," Mr. Eckart replied.

This is just what Sapolin has accomplished by a completely revitalized sales program that has been the talk of the industry.

Mr. Eckart notes that the single most important objective in any modern retailing is fast, profitable turnover. In the paint industry, this has created a dilemma for many dealers who must provide color service to the customer. Because white and ready-mixed colors comprise the great majority of color demand, a dealer must inventory heavily to meet peak traffic periods.

Unfortunately, over 50% of these ready-mixed colors are, relatively speaking, slow movers. Hence, the dealer's over-all turnover on his ready-mixed line is greatly reduced. A pure tint base system which theoretically affords maximum turnover is definitely not the answer. As pointed out above, not only are ready-mixed colors in greatest demand, but also custom-tinted colors carry a considerably higher price tag to the consumer. Moreover, dealers are unable to provide custom service during rush periods.

HOW does Sapolin solve the basic color dilemma? Sapolin's marketing experts have evolved a unique approach in which a compact, interior ready-mixed line is offered to a dealer on the following basis:—the basic ready-mixed color line includes only those colors which account for 70% of the total ready-mixed demand. They number less than half of the colors in the average ready-mixed line. A special color card then shows the less popular shades, carried ready-mixed in other systems, as colors easily obtainable by adding colorants to the short line of ready mixed shades.

Sapolin's color systems are attractively merchandised to the consumer through the company's unique Fashion Color Centers which are set up in the retail outlets on a uniform basis. Here, in an atmosphere conducive to casual perusal and selection, colors are presented in their best possible light, and large sample swatches give a realistic preview of the finished result.

The Center is usually supplemented with either Sapolin's automatic or portable split-second "Fashion Color" Blender for those who wish to have their colors custom mixed. Both the electronically and manually operated devices produce the desired shade at just the press of a button, thereby saving precious time during busy periods.

"Paint has too long been taken for granted," Eckart declared. "The recent products such as roofing paints that insulate against cold and heat, the rubber based masonry paints, the latex house paints, have struck a new and exciting note in our industry. Customers are asking what's new in paint instead of just requesting the general purpose paints of old."

"In our promotions and merchandising, the paint industry must stress the need for frequent changes of color in backgrounds to keep up with the latest decorating fashions. Color is running riot in American life today, and the paint industry should see to it that this trend continues," Eckart declared.

"We at Sapolin are betting on attractive ready-mixed colors that will sell well and quickly at the retail level," Mr. Eckart said. "And as a backstop for tinted shades, we have automatic and manually operated devices for custom blending. By stressing the right colors, at the right prices, always keeping quality uppermost, we think we have the winning combination."

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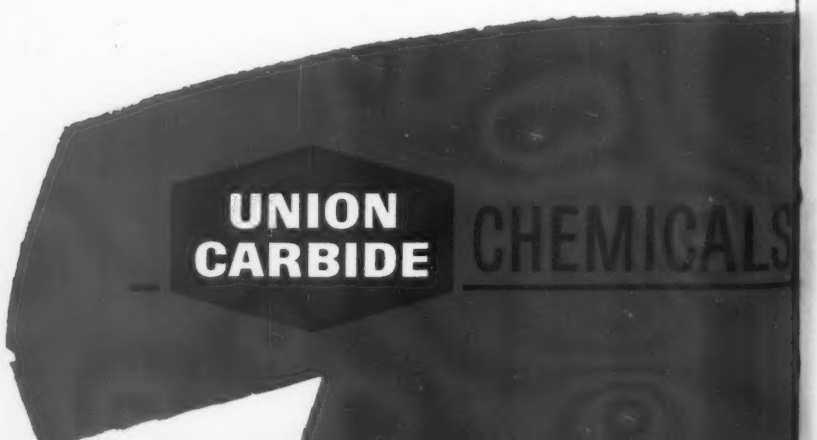

By

Edward Anthony

The author expresses his random reflections on various aspects of the paint industry. The opinions contained in this column are his alone and do not necessarily reflect those of this publication.

Marching Technocracy

ANOTHER outpouring of graduates has just entered the labor market... Quarterly the banks of the country continue to compute their compound interest payments... The increasing number of families formed and the steadily climbing birth rate are statistical facts. In these three statements may be read the motivating forces behind the necessarily continual expansion of production. If this country's standard of living is to improve, as it has so remarkably in the past, absorption of goods by our increasing population must also rise.

The United States Department of Commerce recently reported that the number of families with an annual income of more than $10,000 increased five-fold between 1947 and 1959, from 1.1 million to 5.5 million, from three per cent of all families in the nation to 12 per cent. Of even greater impact on the over-all economy is the increase from 17 to 43 per cent of the $5,000 to $9,999 group.

Basic changes in the spending habits of Mr. and Mrs. U. S. A. are being noted by the gatherers of such information. Forty cents of every dollar that we spend are channeled into *consumer services*—including travel, recreation, education, rent, cosmetics, etc. Both the *non-durable goods* category (46.5 cents on food, clothing, gasoline, tobacco, liquor), and the *durable goods* group (13.4 cents for automobiles, furniture, appliances) are trending downward. The marketing question today is not whether the public *will* buy, but rather *what* they will choose from the multitude of services and products available to them. *Selective spending* that reflects constantly changing attitudes, desires and goals is the key to new tastes, values and status symbols.

The advent of science and technology as the most important fac-

tors influencing the growth of the country dominates the nation's industrial pattern. Amazing proportions of goods are now produced that have been incubated only within the last decade. Whole industries which were spawned between the two World Wars are now reaching maturity. The older, less transient requisites of food, clothing and shelter have been greatly changed in their basics by this new type of revolution, through the incorporation of the products of the newer industries into their own schemes. The *glamor group*—electronics, nucleonics, missles, instrumentation, computers, pharmaceuticals, and so on—are often referred to as *growth industries*. That they are expanding rapidly is tribute not only to their filling important new needs, but also to the recognition by other industries of their helpful contribution toward better and less expensive products that the utilization of these new and different approaches can offer.

Professional Employees

IF the corporate and governmental enterprise of mid-twentieth century is based on technology and science it most certainly must derive its strength from men trained in these specifics. The value of education can hardly be overestimated in these days of specialized attack on the problems of progress. Research, development, technical service, sales, finance, promotion, management—all of the facets of modern business necessary for the birth and growth of new products and processes—are increasingly staffed by individuals trained in depth.

A survey of 18 companies, including over 1500 key technical management men, by *Chemical Processing* (February, 1961), indicates that at the corporate and division level over half the personnel had earned a chemical engineering degree. Only nine per cent had no degree. At the plant level about one-third of the management people had no degree and 37 per cent had been trained in chemical engineering, ratios that suggest that self-education is still a pathway to success, though the road is rougher and narrower than ever before.

And the problems attendant on compensating these men who supply the mental sinews of progress are multitudinous. The 1960 biennial salary survey of the Engineering Manpower Commission of Engineers Joint Council indicates that the median annual salary for engineers is now at $9600 (in 1958 the rate was $8750). But this indicates only half the cost when Research and Development are considered, for total cost is about twice the salary expense.

Illuminating as figures are, the method by which a man's worth is calculated is equally interesting. As interpreted by C. W. G. Van Horn before a personnel conference of the American Management Association (and reported in *Chemical and Engineering News*, February 27, 1960), *Job Content* is composed of three secondary building blocks, each divided into more elementary considerations: *Know-How* (practical, specialized, or technical ability; skill in motivating people; management ability), *Problem Solving* (freedom to think independently, mental activity), and *Accountability* (freedom to act independently, size of the effect on the end result, nature of the effect).

By assigning appropriate numerical values an index showing the relative value of each job in the overall scheme, may be developed.

In evaluating technical and professional personnel, extra-incentive criteria should also be considered:

"*success*—the employee's extra efforts must produce something of value to the firm; *opportunity*—jobs differ in what they can offer; *performance*—does the employee measure up to his opportunity?"

The problems introduced by the advent of totally different socio-economic conditions than we are used to—automation, instrumentation, expansion, management, creativity—will not be solved by any less thorough exploring than that which these very conditions are capable of doing.

The Paint Story

EPOXIES, urethanes, polyesters, acrylics—flow, curtain and reverse roller coating—emulsion and water-soluble vehicles—ultrasonic cleaning of metals, infra-red curing of coatings — pre-finished wood, metal and hardboard—blister-resistant house paints, roller and spray application of trade sales items: these are but a portion of the advances since the end of World War II. In the resins, pigments and solvents of which organic coatings are composed, in the various methods of their application on a multitude of substrates to meet increasingly rigorous standards of performance—in fact, within every facet of the industry—the impact of the new and different is all about us. Whether it be in the trade sales or industrial aspects of our business, a plateau of time for the digestion of the progressive technological steps is denied us; they come rapidly, tumbling one upon another; exploitation is often based on novelty rather than thorough investigation.

To generalize, today's finishes apply more easily, last longer, and do a more commendable job while they are being utilized than those of but a few years ago. The end-product of no other industry is so subject to the scrutiny of the public. More than can be measured, the automobile and appliance are purchased because of the depth and gloss of the finish; the house and hearth are admired in proportion to the gleaming, clean surface. Visual impact at the point of sale is a prime function fo surface finishes. Oft times it is the only obvious difference between two otherwise apparently identical products.

Concurrent with the impressive improvements which have been built into chemical coatings during the past few years, competitive materials have been developed which invaded once inviolate outlets. Various synthetic high polymers—*plastics*—have been particularly active in usurping a multitude of small constructions, once the province of coated metal or wood. Laminating techniques allow the use of highly durable and resistant polymer sheeting as an outer surface. For large structures *reinforced polyesters* — with incorporated color — have partially replaced metal pressings and castings or built-up wooden forms. So our problem is tied to changing—*advancing*—technology. The impact is felt all about us, not only in our own industry. Some enterprises in our industry have expanded horizontally, to incorporate within their compass many of these competitive items.

Aggressive scientific endeavor is the only way to adapt our products to the needs of the consuming public; aggressive marketing — methods and salesmanship — is the only way to promote our products into public consciousness and acceptance. The market place in these changing times is a merciless crucible. The successful product not only satisfies a need, it also must have a psychological superiority over competitive items. And the paint business has plenty of competition!

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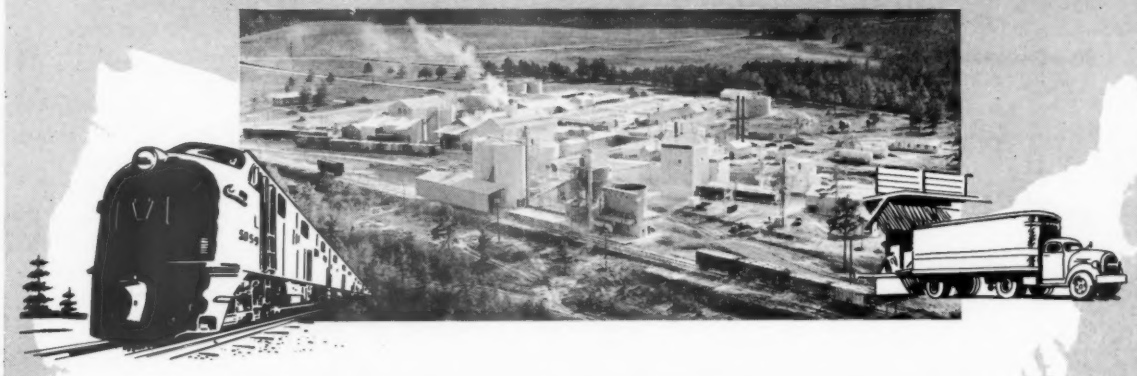

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GEORGIA, ATLANTA (DECATUR)
Dooks & Company
186 Rio Circle
Drake 7-3871

ILLINOIS, CHICAGO 8
Kraft Chemical Company
917 West 18th Street
Seeley 3-1919

KENTUCKY, LOUISVILLE 2
The L. A. Miller Company
314 Republic Building
JU - 3-9667

LOUISIANA, NEW ORLEANS
Griffith—Mehaffey Co., Inc.
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Magnolia 1386

MARYLAND, BALTIMORE 17
G. T. Weiss, Inc.
1101 N. Payson Street
Longwood 6-1303

MASSACHUSETTS, BEVERLY
J. R. Powell Company
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Walker 2-5194

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Skelton Chemical Company
8830 West McNichols Road
University 3-2300

MISSOURI, KANSAS CITY 6
Morton-Myers Company
220 E. Missouri Avenue
Grand 1-0525

MISSOURI, ST. LOUIS
Harry A. Baumstark & Co.
6801 Hoffman
Mission 7-1234

NEW YORK, BROOKLYN 29
Arthur I. Hartman Company
1707 Kings Highway
Nightingale 5-1167

NORTH CAROLINA, HIGH POINT
Dooks & Company, Inc.
H. P. T. & D. Railroad Building
P. O. Box 565

OHIO, AKRON 12
S. S. Skelton Company
104 Lapper Road
Republic 3-6231

OHIO, CINCINNATI
Dooks & Company
6433 Wiehe Road
Melrose 1-1688

OHIO, CLEVELAND 20
S. S. Skelton Company
2775 S. Moreland Boulevard
Wyoming 1-2323

OREGON, EUGENE
Great Western Chemical Co.
2790 West 6th Avenue
DI 3-7744

OREGON, MEFFORD
Great Western Chemical Co.
P. O. Box 1252 (White City)
TA 6-2421

OREGON, PORTLAND 10
Great Western Chemical Co.
3720 N. W. Yeon Avenue
CA 6-2451

PENNSYLVANIA, CARNEGIE (Pittsburgh)
Campbell Chemical Company
40 E. Main Street
Walnut 2-2522

PENNSYLVANIA, FLOURTOWN (Phila.)
E. W. Kaufman
P. O. Box 27
Turner 7-6161

TEXAS, DALLAS
Jo—Ro Chem. Company
2551 Farrington Street
Riverside 8-8858

WASHINGTON, SEATTLE 8
Great Western Chemical Co.
6900 Fox Avenue
PA 5-6350

WASHINGTON, SPOKANE
Great Western Chemical Co.
1133 West College Ave.
FA 7-5588

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Great Western Chemical Co.
115 West D Street
GL 2-8568

CANADA, MONTREAL 29
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6333 Decarie Boulevard

CANADA, TORONTO 1
The Pigment & Chem. Co., Ltd.
137 Wellington Street W.

B. C., VANCOUVER 9
The Pigment & Chem. Co., Ltd.
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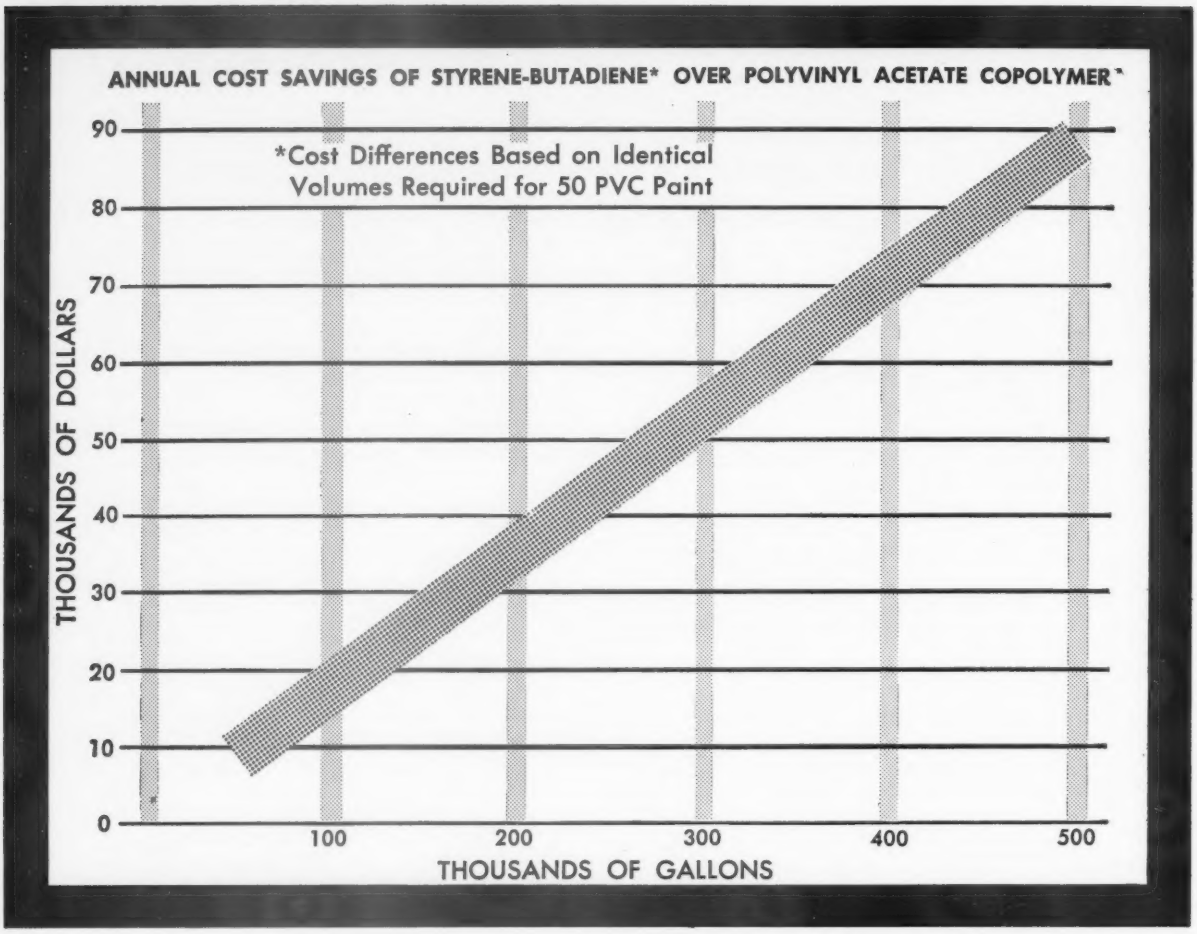
Burgess Pigment COMPANY

Mines and Plants: Sandersville, Georgia

EXECUTIVE SALES OFFICES: P. O. BOX 145, SANDERSVILLE, GA.

- **HYDROUS AND ANHYDROUS ALUMINUM SILICATE PIGMENTS**
- **KAOLIN CLAYS**



Annual cost savings using Dow styrene-butadiene latex in place of polyvinyl acetate copolymer (based on identical volumes required for a 50 PVC paint).

DOW S/B LATEX CAN REDUCE BINDER COSTS 28% COMPARED TO PVAc LATEX!

You can make highest quality latex paints, and save thousands of dollars a year on raw material costs when you use Dow styrene-butadiene latex instead of polyvinyl acetate copolymer!

Dow S/B latex costs less than PVAc copolymer . . . 18% less per pound of solids. And Dow S/B latex also offers more volume than PVAc, pound for pound of solids. You can make *more* paint for *less* money.

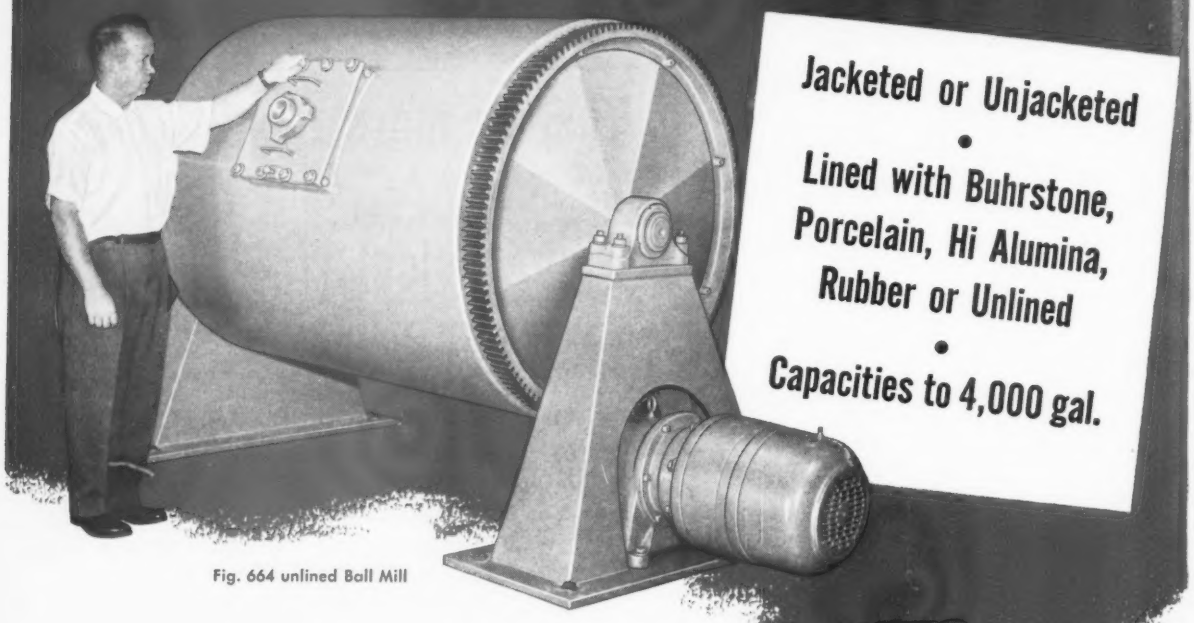
Here's why. Dow S/B latex solids have a specific gravity of 1.03, compared to 1.17 for PVAc. Consequently, a pound of Dow S/B latex solids has approximately 14% greater volume than a pound of PVAc latex solids. Therefore, at equal binder volumes, the cost of Dow S/B latex solids will be 28% less than the cost of PVAc solids.

You'll gain more than savings using Dow S/B latex. The Dow methods of careful batch-blending and strict quality control provide maximum uniformity and high quality. You'll reduce your problems of both formulation and production control. *Most important,* you'll find S/B latex paints offer your customers the high quality that helps build sales.

Learn more about how Dow latexes and other paint materials can help reduce your paint-making costs and problems. For detailed information, write Coatings Sales Department 1903DL8.

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

"U. S." Ball and Pebble Mills



Jacketed or Unjacketed

•

Lined with Buhrstone, Porcelain, Hi Alumina, Rubber or Unlined

•

Capacities to 4,000 gal.

Fig. 664 unlined Ball Mill

Built to exacting design standards, "U.S." Ball and Pebble Mills offer many features that contribute to long, relatively maintenance-free operation. The heavy steel plate cylinder is welded to fabricated steel heads with extra heavy shrouded reinforcing ribs. The cylinder is supported by integral trunnions, precision-machined, to operate in anti-friction bearings mounted on sole plates. The dust-tight tapered roller bearings have a life expectancy of better than 300,000 hours. The cylinder is equipped with a wide face, fine tooth machine cut ring gear, precision fitted and bolted to a machined seat. The matching pinion is mounted on an oversize countershaft supported by rugged anti-friction bearings. These mills are built to stand up under the most punishing service you can give them . . . year after year.

FIG. 564 SOLID PORCELAIN PEBBLE MILL

Made in seven sizes: 12, 27, 52, 87, 117, 158 and 210 gals. These mills feature an alumina fortified porcelain body for long wear and minimum contamination. In the three smaller sizes the grinding jars are one-piece. In the larger sizes the jars are made in three pieces, match-fitted and cemented into a heavy steel housing.

"U.S." Ball and Pebble Mills are fully described in Bulletin BM-290. Contains complete specifications on the full size range, drive details, controls and optional accessories. Write for your copy today. Address Process Equipment Division, U.S. Stoneware, Akron 9, Ohio.

269G-3

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE

AKRON 9, OHIO

New York • Chicago • Houston • Los Angeles

PRODUCTION

PACKAGING

MATERIAL HANDLING

NEW EQUIPMENT and MATERIALS

Modern electronically-controlled resin cooking equipment enable Sapolin's Brooklyn plant to increase its production of paint vehicle and varnishes at reduced cost. For details, see page 69.

Increase visibility and durability with Celite Pigment Extenders

For maximum night-time reflectivity in paints that can take the daily stress of heavy traffic, use Celite® diatomite extender pigments.

Celite's irregular particle shapes toughen paint films, providing both excellent resistance to wear and highly diffused light reflection. This gives traffic stripes high visibility day and night. Celite's acicular and perforated disc structures produce a unique interlacing film-reinforcing effect, for maximum resistance to abrasion and cracking. Paints will dry faster, too, because the open structure of Celite particles promotes rapid solvent release.

For full details on Celite pigment extenders, write Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

JOHNS-MANVILLE JM

MODERNIZED RESIN "KITCHEN" USES RADIANT HEAT

By
William H. Lerstad*

IN June 1959, a modern, electronically controlled resin "kitchen"—employing advanced radiant heat processing methods which had been production-tested vs. conventional oil-fired methods—went into full-time operation at Sapolin's Brooklyn plant. Two large batch-cooking kettles were installed in the new kitchen, which was constructed by Industrial Process Engineers, replacing the use, elsewhere at the plant, of nine open-fired settings and kettles.

*General Superintendent, Sapolin Paints, Inc., Brooklyn, N. Y.

Result

Increased volumes of synthetic resins and bodied oils are not only being processed faster and at reduced costs, but the plant is also now able to produce all of Sapolin's own alkyds, which previously had to be purchased from outside sources.

In addition to these marked production increases and savings, troublesome and costly handling problems have been eliminated. Uninterrupted batch-cooking schedules are also now being assured—without any fuel shortages and shutdowns—natural gas being piped directly to the resin kitchen.

Gradiation Heating Method

The improved resin cooking method at Sapolin involves the use of two enclosed Gradiation settings (Fig. 1)—built by Selas Corporation of America, Dresher, Pa. Each of the 1800-gallon kettles is mounted in a setting, only 12 inches above a cluster of Duradiant burners on the bottom.

The cluster, comprised of three

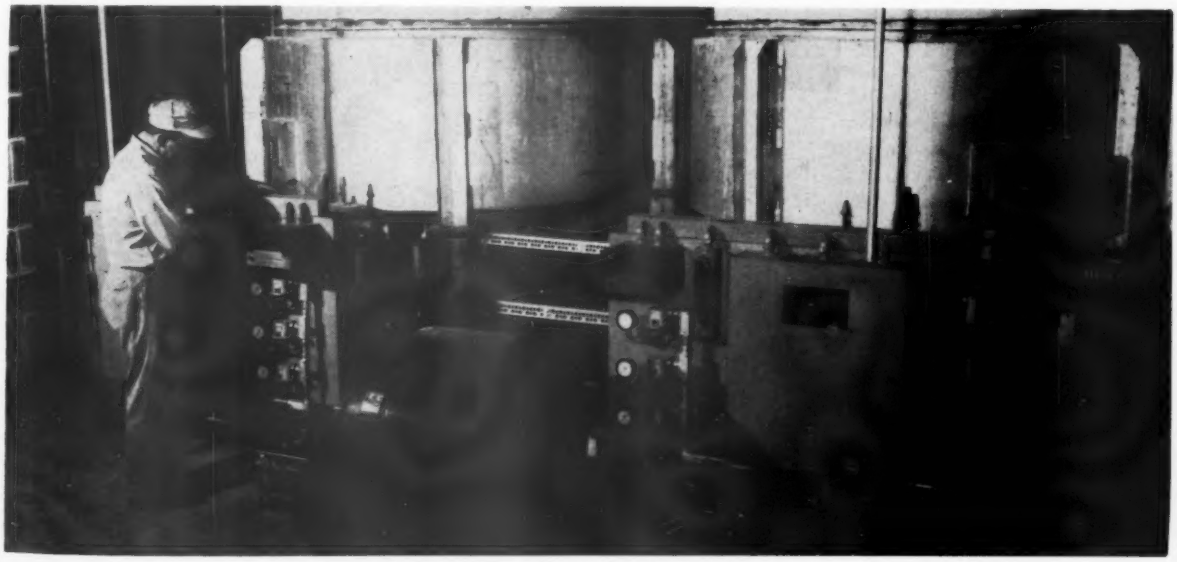


Fig. 1. Operator presses automatic ignition starter in front of enclosed Duradiant setting, starting three rings of burners for cooking a varnish used as a paint vehicle.

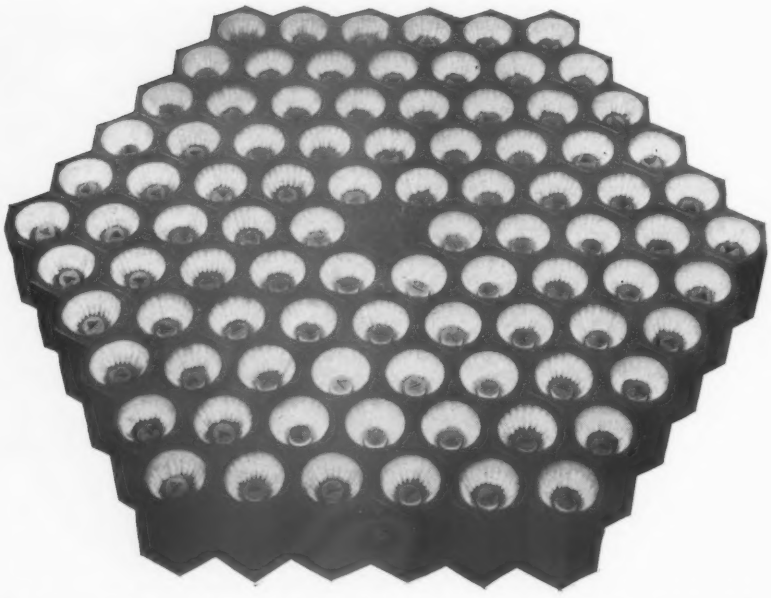


Fig. 2. Typical Selas-built Duradiant setting, which provides radiant heat by burning closely-controlled gas-air mixtures against special cup-shaped refractory surfaces of burners.

separately controlled groups of burners (Fig. 2), creates heat by burning a controlled gas-air mixture against the burners' special, cup-shaped refractory surfaces. The cup surfaces, in turn, beam radiant heat to the bottom of the kettle.

An accelerated heating rate in processing batches of resins, varied oils and alkyds, is achieved by a combination of this controlled rate of uniform heating and close proximity of the kettle to the heat source. Such proximity is possible because the burners produce no harmful flame impingement on the bottom of the kettle that would cause hot spots and charring of a batch, thereby assuring absolute maintenance of Sapolin's high quality paint products.

Along with faster heating, each Duradiant cluster also provides an exceptionally wide range of heat input for its respective kettle—a maximum rating of 2,800,000 Btu per hour, and a minimum of 145,000 Btu per hour. With automatic combustion and temperature control systems designed to respond quickly and accurately to process changes, the operator is able to follow and duplicate exactly a given set of control conditions for each type batch, or vary the process as the situation demands.

New Methods vs. Old

For many years, prior to building the new kitchen, Sapolin had used seven, open, oil-fired settings. With expanding sales and the development of several important new product lines, additional cooking facilities became necessary. Two Selas open gas-fired settings were added, giving a total of nine.

Close comparison between the two differently-fueled, open-fired methods was made, day in, day out. And the comparison figures obtained over an extended field-test period were almost phenomenal. The two gas-fired radiant settings showed an increase in production capacity of 50% per kettle over the oil-fired units; 50% fuel savings were also realized with the two radiant settings.

With such conclusive test results and figures, there was no question as to what type of heating units to install, when the time came for building a new kitchen to replace the nine open settings and increase production capacity.

Cooking A Batch

A look into the Sapolin resin kitchen at a typical batch-cooking operation reveals several other outstanding benefits being enjoyed with the automatic radiant heating equipment—the most important of which is *precision heating* for *quality control*.

Let's take a typical example for processing a varnish used as a paint vehicle. An initial load of 3500 pounds of oil and 2500 pounds of solid resin is first pumped and loaded into the kettle. An operator on the second floor checks through a small window at the top of the kettle (Fig. 3) to make sure it flows in freely.

Next, a purge system—which makes controlled purging of the furnace combustion chamber necessary for every batch before the pilot burner can be ignited—is turned on. As soon as the automatically-timed 4-minute purge cycle is completed, a safe start light indicates that the pilot burner can be ignited with the push of the pilot start button (see operator in Fig. 1), and automatically three individual rings of burners are then started, and the kettle turbine blades set in motion at 300°F after resin is melted. The electronic control system is so arranged as to shut off the main gas supply line in event of electrical, pilot flame or gas pressure failure, or a sudden unusual high increase in temperature over a pre-set maximum. In the latter case, an automatic water valve opens and cold

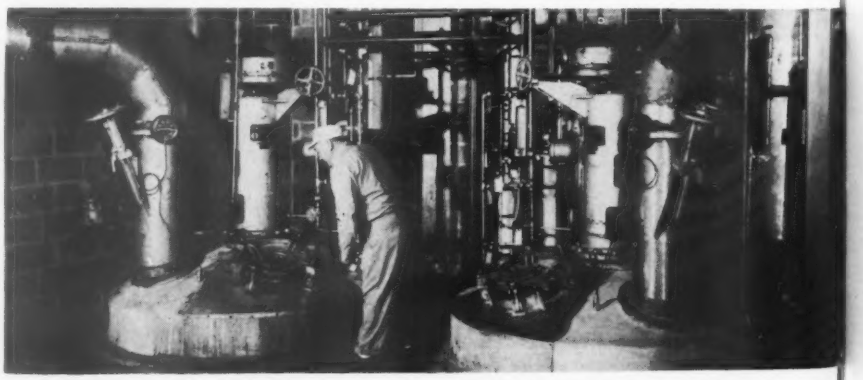


Fig. 3. Operator, on second floor of kitchen, checks through window at top of kettle to make sure batch load being pumped in is flowing freely.

Fig. 4. After two additions to heated batch at 400°F. and 505°F., note how burner adjustments provide more gradual temperature rises required to comply with reactions in kettle. Note, rapid dissipation of heat after burners are shut off at end of heating cycle.

water is sent through cooling coils which are immersed in the liquid.

It takes the radiant heat only a little over two hours to bring this initial batch load up to the desired 400°F, at which point a chemical addition is made to the solution. As soon as the temperature starts to rise again, after dropping to 370°F, one ring of burners is shut off, allowing just two burner rings on for a more gradual reheat.

The temperature is brought from 370°F to 505°F, at this slower rate, in about 2 hours. At about 485°F, before reaching this second peak level, another ring of burners is shut off, allowing the temperature to come up even more slowly the last 20°F.

After reaching 505°F, the temperature is held for a reaction, and then about 700 pounds of treated oil are added. The last ring of burners is shut off at this point, permitting the temperature to fall to 435°F. All three rings of burners are then put on again and the batch brought gradually up to the final peak temperature of 560°F in 1¾ hours. About 25°F before reaching this final peak level, one ring of burners is again shut off, and a second ring shut off as the batch reaches 540°F.

The batch is held precisely at 560°F while tests are made for viscosity and acid number to determine if they meet desired standards.

As can be noticed on the time-temperature chart (Fig. 4), temperatures were held to within ± 2°F of the predetermined peak and low levels, mentioned above, throughout the heating cycle. The fine control possible with the Gradiation system also enabled the operator to hold temperature precisely to desired reheat time rates, following the addition of material, a critical need which is decided in

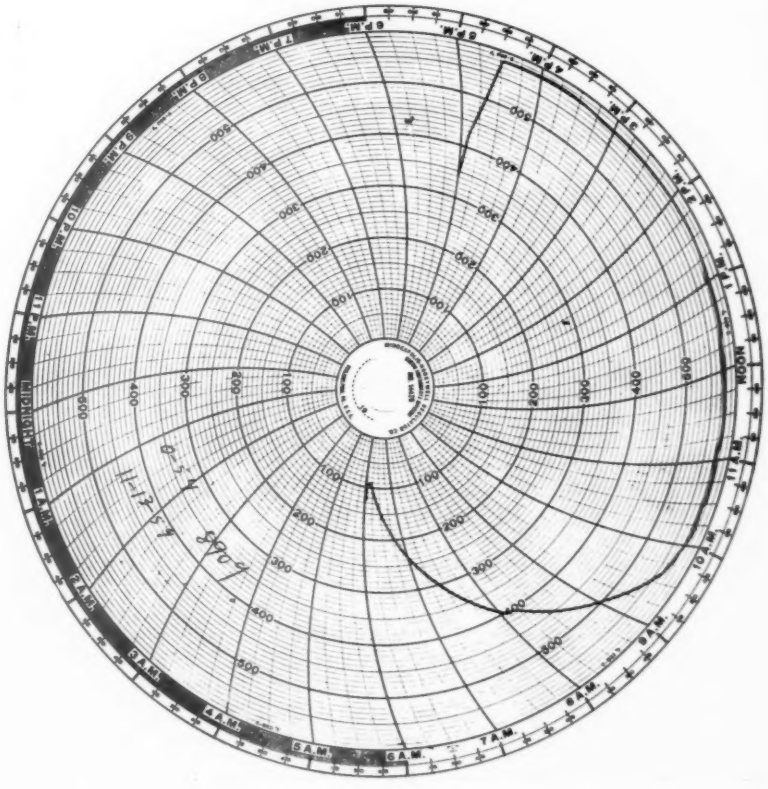


Fig. 5. Temperature is maintained within a few degrees of predetermined peak level over an 8-hour holding period, assuring quality results from this bodied-oil cooking.

each instance by the reaction in the kettle.

Once the tests have been satisfactorily completed, the last ring of burners is shut off and the batch quickly cooled to 460°F by means of water through cooling coils. The rapid dissipation of heat from the burners helps significantly in bringing the temperature down, at the desired fast rate, to this level.

At 460°F, a little over 200 gallons of mineral spirits is added into the kettle to thin down the batch. The balance of mineral spirits is added after the batch has been pumped into the blending tank, bringing the batch to its proper solid content of approximately 55% solids and 45% mineral spirits.

Gradiation Extras

In addition to the easy and precise temperature control possible at each step of an operation with the electronically-instrumented Gradiation system, which enables the operator to comply instantaneously with changing demands, the burners can also be set to shut off at a predetermined time. This helps to eliminate the possibilities of any human errors occuring, at the same time relieving operators of the need for constant attention to the process.

Or, should a certain process require holding a temperature at a certain high level over an extended period of time, the capability of the system to do this without the temperature varying more than a few degrees from the desired level is demonstrated in the Chart in Fig. 5—processing a bodied oil. This is accomplished by the use of the last ring of burners, with heat output automatically modulated by the temperature setting on the control panel.

Maintenance costs — another point always of major concern when new equipment is under consideration—have been greatly reduced from those of the former oil-fired, flame-type batch cooking units. The new radiant settings, in operation almost two years, have required no burner replacements, with the exception of an occasional cup for the pilot burner alone, in each cluster.

HET® ACID MAKES FIRE RETARDANCE A PART OF YOUR PAINT... *not something added*

Here is a dibasic acid that is more than 54% stable chlorine by weight, which you can make an integral part of alkyd resins. That much chlorine chemically locked into resins will give your paint fire retardance.

You can easily react Het® Acid with polyols and fatty oils, fatty acids, or monoglycerides to form oil-modified alkyds. Coatings made from these alkyds have excellent hardness, gloss, and water resistance as well as fire resistance. Het Acid is provided as fine, white crystals assaying 99.5%. Its high solubility permits the formation of resins without going through an alcoholysis step.

For more particulars, including procedures and examples of several oil-length resins, send the coupon for our bulletin on Het Acid. While you're about it, perhaps you'd like data sheets describing some of these other Hooker products which are also used in the paint industry.

Alkyl Acid Phosphates—catalysts for hardening resins.

Benzoic Acid—polymerization stopper for alkyd resins.

Chlorinated Paraffin (40% Cl_2)—used in a variety of paints, enamels and stains.

MPS® 500 (methyl pentachlorostearate) (36% Cl_2)—secondary plasticizer for vinyls.

Niagathal® (tetrachlorophthalic anhydride)—contains 49.6% stable chlorine. Used as a fire-retardant intermediate for alkyds and polyesters.

Trichlorethylene—nonflammable solvent for paints used in the new closed-system coating processes.

Triphenyl Phosphite—to improve color and clarity in alkyds, also in plasticizer applications.

Tetrapotassium Pyrophosphate—for pigment dispersion and emulsion stabilization.

Phenolic Resins—several resins for coatings which are highly resistant to acids, alkalies, gas fumes, and strong solvents.

Caustic Soda, Caustic Potash and Carbonate of Potash—in many grades and forms.

HOOKER CHEMICAL CORPORATION

1103 FORTY-SEVENTH STREET, NIAGARA FALLS, NEW YORK

HOOKER CHEMICALS PLASTICS

Send me data on: ☐ HET® Acid ☐ Alkyl acid phosphates ☐ Benzoic acid ☐ Chlorinated paraffin ☐ MPS-500® ☐ Tetrapotassium pyrophosphate ☐ Niagathal® ☐ Trichlorethylene ☐ Triphenyl phosphite ☐ Phenolic resins ☐ Caustic soda ☐ Caustic potash ☐ Carbonate of potash.

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the paint industry's most versatile line

GRADE (Lead-free)	BULK DENSITY lbs./cu. ft.		PARTICLE SHAPE	PARTICLE SIZE	OIL ABSORPTION (Rub Out Method)	FOR PAINT CONSISTENCY (Rated High to Low)
	Conventional	AZODOX*				
AZO-22	20	35	Acicular	Long	21	5
AZO-11	23	40	Acicular	Medium	18	4
AZO-33	27	46	Acicular	Short	16	3
AZO-55	32	60	Nodular	Small	14	2
AZO-55-LO	36	65	Nodular	Medium	12	1
AZO-66 (French)	28	—	Nodular	Fine	12	–
AZO-77 (French)	24	—	Nodular	Fine	12	–

No need to compromise on the properties you want in your paint and enamel formulations. Set your specifications—then from the complete AZO line of lead-free zinc oxides choose the particular grade to meet your exact requirements. American Zinc is the only producer of acicular lead-free zinc oxides covering the full range of oil absorptions from high to low—including the intermediate ranges—in both conventional and Azodox forms.

In your formulations, AZO lead-free zinc oxides increase hiding power, film strength and tint retention . . . control chalking, inhibit mildew growth. Controlled refining of AZO zinc oxides removes objectionable fine particles, increases brightness and insures uniform consistency. WRITE FOR COMPLETE INFORMATION.

*AZODOX is American Zinc's de-aerated form of zinc oxide, with high apparent density. All other physical properties remain unchanged. Faster handling, less storage space, quicker mixing.

American Zinc also produces a wide line of leaded zinc oxides for general use in exterior house paints.

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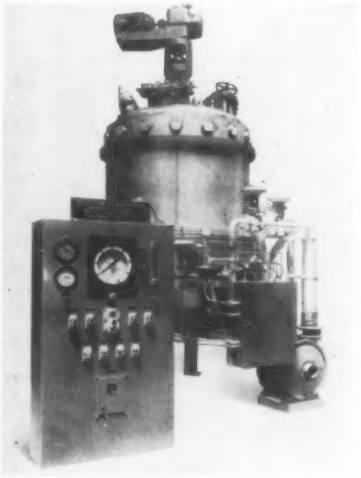
NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.

RESIN KETTLE
500-10,000 Capacity

Kettle for distilling synthetic resins is fabricated from stainless steel. It is designed to handle a variety of resins, varnishes and bodied oils. Under actual operating conditions, the manufacturer claims, this unit shows less cooking time, clearer alkyds, better quality and uniform viscosity. Principal heat transfer is accomplished through vapor condensation, and the gas-fired unit is jacketed or insulated for liquid or vapor heating.

Brighton Corp., Dept. PVP, 820 State St., Cincinnati, Ohio.



BRIGHTON

Correction

In the article, "Rheology—Its Significance in Paint Manufacture and Application", mention is made of the material, Aerosil. In the United States, this material is called Cab-O-Sil, produced by the Cabot Corporation, 125 High St., Boston 10, Mass.

FILM APPLICATOR
Two-Path Type

The 2-path wet film applicator has a path on each side so that film thicknesses of 1 and 2 mils or 3 and 5 mils may be laid precisely. Generally used in conjunction with hiding power and penetration charts, it may also be used in adhesive, plastics and coating industries for a variety of tests. The 2-path wet film applicator has paths calibrated in actual depths for maximum accuracy. Path depth and parellism are held within .0001".

Precision Gage & Tool Co. Dept. PVP, 320 E. Third St., Dayton 2, Ohio.

PRECISION

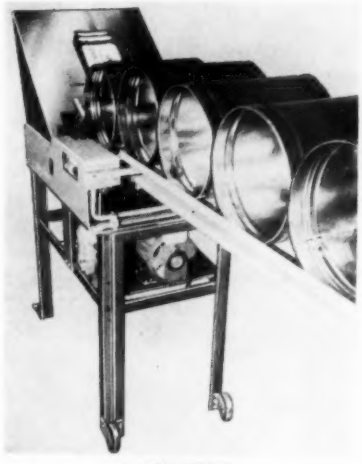
IMPROVED ANTIFOAM
Effective at High Temperatures

Improved antifoam fluid, it is said, not only quells foam, but is effective in foam prevention. Simple and economical to use, it eliminates waste, reduces processing time and potential fire hazard, and permits fuller use of productive capacity.

An improved version of Union Carbide "SAG" 47 antifoam, this new product has greater storage life and stability.

Designed especially for quelling foam in non-aqueous and aqueous systems, it is versatile, in that it can be used to control foam levels while not totally suppressing foam, if so desired. Recommended uses include manufacture of adhesives, resins, solvents, inks and pigments, varnishes and lacquers.

Union Carbide Corp., Silicone Div., Dept. PVP, 270 Park Ave., New York 17, N. Y.



LABELETTE

CONTAINER LABELER
With Electronic Feed

Automatic container labeler with an electronic feed speeds up labeling process on a diversified product line.

Model 12 is designed to fill the need of an intermittent labeling machine capable of handling up to 5-gallon containers along with the other customary smaller sizes in a diversified product line. Labor costs are held to a minimum because the machine can be operated by one man, according to the manufacturer. Other features include a mobile floor stand with casters for easy portability, non-jamming glue attachment, label register mechanism and a half-horse motor with variable speed control.

Lablette Co., Dept. PVP, 216 South Jefferson St., Chicago 6, Ill.

ALUMINUM ALLOY
In Powder Form

METHACRYLATE MONOMERS
Antistatic Agents

Commercial quantities of dimethylaminoethyl methacrylate (DMAEMA) and *tert.*-butylaminoethyl methacrylate (t-BAEMA) are now available. These compounds are readily polymerizable acrylic

monomers which provide a means of introducing pendant, reactive amine groups into plastics, elastomers, coatings, and fibers. They may also be useful chemical intermediates as their amine groups and double bonds can enter into a wide variety of reactions.

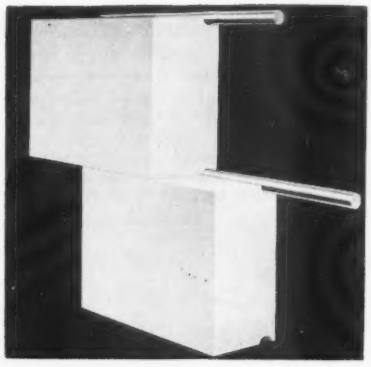
The amine functional group permits preparation of copolymers which have improved adhesion to a large number of substrates and which provide anchoring sites for dyes and pigments. Sufficient DMAEMA or t-BAEMA can be incorporated to yield water-soluble copolymers. Acid-soluble copolymers can be obtained by using small amounts of these monomers. Molecular weights can be varied to provide copolymers with either dispersing or flocculating properties. The chemical reactivity of the amine group, particularly the secondary amine in t-BAEMA, permits the use of these materials in the preparation of thermosetting acrylic coatings.

Rohm & Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.

HIGH DENSITY BRICK
Eliminates Failure

Newly designed high density brick for ball mills is said to produce a reinforced lining to prevent end lining failure. A groove in each brick accommodates a metal reinforcing rod, which is fastened to the mill end at regular intervals, with clips. This technique provides a positive joining to the mill end, eliminating the possibility of failure. Through this design, the manufacturer claims, the end bricks are actually locked to the mill end.

Coors Porcelain Co., Dept PVP, 600 Ninth St., Golden, Colorado.



COORS

ESTERIFYING CATALYST
Metallic Type

Linear polyesters for use in resins and paints can be prepared economically by transesterification (ester interchange) using metallic-type catalysts. Stannous oxalate shows promise in direct, trans- and polyesterification reactions. According to the producer stannous oxalate appears effective in systems such as neopentyl glycol-adipic, phthalic anhydride-isooctyl alcohol, etc.

Metal & Thermit Corp., Commercial Development Div., 100 Park Ave., New York 17, N. Y.

VERSATILE FILLER
Easy Changeover

Karl Kiefer Machine Co. announces new design of its Vari-Visco filler, which is capable of filling more than 300 containers per minute.

Using the time tested Vari-Visco filling machine principle, this new machine features even greater production versatility. A through conveyor serves the machine. A worm timer on a floating mounting, besides large diameter feed and discharge wheels provides extra smooth container handling. Elevating stainless steel trays gives "bottomup" filling. The center column drive is equipped with a safety detent operating a limit switch in the motor control circuit which also makes for easy adapta-

STABLE FORMALDEHYDE
Reduces Tank Order Costs

Stabilized formaldehyde is available in a new form that defies winter temperature and can reduce tank truck order costs as much as 90 dollars. New formaldehyde can be stored more than a month at 20-30 degs. F. below the storage temperature of its equivalent unstabilized form.

Stabilized 37% methanol-free formaldehyde is interchangeable with any other commercial formaldehyde for the same broad field of application, according to the producer.

User advantage: he receives a formaldehyde with greater resistance to polymerization induced by freezing atmospheric temperature, and runs less risk of shipments being made unusable.

Heyden Newport Chemical Corp., Heyden Chemical Div., Dept. PVP, 342 Madison Ave., New York 17, N. Y.

CAP SEAL
Polyethylene Type

Polyethylene seal is the easiest and safest to remove all types of cap seals, according to the manufacturer. The seal is said to be tamper proof and it must be destroyed to reach the contents of the drum. It seals directly on the drum metal and not the flange or the drum plug. Available in both 2" and ¾" sizes, and can be affixed with standard "ViseGrip" sealing tools for all gauge thickness of drum stock from 26 to 16 gauge.

Rieke Metal Products Corp. Dept. PVP, Auburn, Ind.

POLYURETHANE ALKYDS
Require No Catalyst

"U" series of polyurethane alkyds and coating resins have been compounded to produce solvent solution coatings. Recommended for marine and exterior coatings, for floors and masonry. It is a solvent solution of a one-can stable polyurethane modified alkyd resin, furnished at 60% solids in mineral spirits. It dries by oxidation as a convention alkyd, requiring no catalyst.

Commercial Resins Corp., Dept. PVP, 1250 W. 7th St., St. Paul 2, Minn.

SURFACE COATING RESIN
Detergent-Resistant

Availability of a unique new surface coating resin, Cymel 255-10 isobutylated melamine formaldehyde resin, has been announced. The baked finishes usually produce 60° gloss readings above 95, and adhesion to metals is unusually good, particularly in highly pigmented enamels with non-oxidizing alkyd resins. Detergent and mild alkali resistance are said to be superior to regular butylated types.

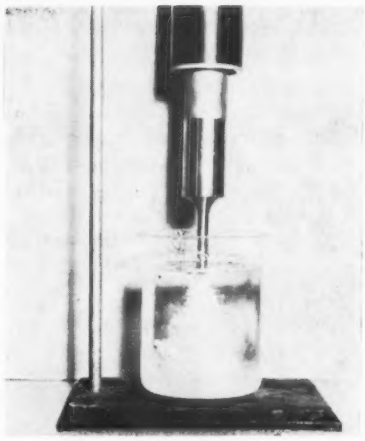
American Cyanamid Co., Plastics and Resins Div., Dept. PVP, Wallingford, Conn.

PLASTICIZERS
Improved Properties

Four new polymeric plasticizers, Plastolein 9722, 9730, 9750, and 9765 have been recently made available by Emery Industries.

Although Plastolein 9720, will continue to play an important part in applications requiring ease of processing and low viscosity, these new plasticizers offer important improvements. Significant advantages include improved humidity and outdoor aging, better permanence and good soapy water resistance.

Emery Industries, Inc., Dept. PVP, Carew Towers, Cincinnati, Ohio.



BRANSON

ULTRASONIC EMULSIFIER
Rapid Lab Tool

Compact ultrasonic emulsifier (S-75 Sanifier) offers several important advantages: rapid emulsifying and dispersing, even in "impossible cases;" reduction in the amounts of emulsifier needed for a particular application; and extremely minute particle size resulting from the ultrasonic treatment.

Materials such as printing ink or paint dispersions are quickly prepared with this unit. Instrument is said to be ideal lab tool for processing plastic, rubber, printing inks, and paint and varnish production.

Branson Instruments, Inc., Dept. PVP, 40 Brown House Rd., Stamford, Conn.

CAN IMPRINTER
Rate-1,000 per Min.

Can imprinting machine capable of marking 1,000 cans per minute has been developed. Designed as an attachment to the production line, the new marker has a unique automatic inertia device which keeps the star wheels in proper position, preventing them from overrunning.

The machine can be easily adjusted for different can heights and diameters and its printing drum can be quickly adjusted for spot printing.

Industrial Marking Equipment Co., Dept. PVP, 655 Berriman St., Brooklyn, N. Y.

What can epoxies do for you that no other resins can do so well?

The answer is *plenty!*

If you already use epoxies on a production or pilot basis for new formulations, you know a good part of the whole remarkable story of why epoxies bring a new sure-fire sales appeal to today's coatings market outloo If you are looking for *new* and *better* markets you know epoxies point the way today.
To both situations, CIBA as the pioneering development producer of epoxies, is uniquely qualified to offer epoxy resins engineered to the special requirements of coatings formulation *and* to extend a quality of technical service unmatched in the field.
We are here to help you . . . prompt, dependable uniform quality delivery of CIBA Araldite® Epoxy Resins from the most modern resin production facilities of their kind in quantities from drums to CIBA tank-car and truck delivery to your doorstep. CIBA's own Technical Field Representatives and Sales Agents are only a phone call away, strategically located to give personalized service new meaning.

CIBA Products Corporation
Fair Lawn, New Jersey

C I B A

CIBA

PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Water-Base Alkyd Resin Paint

U. S. Patent 2,985,602. Ronald L. Broadhead, Park Forest, Ill., assignor to Standard Oil Co., Chicago, Ill., a Corp. of Ind.

A water-base alkyd resin paint consisting essentially of a water insoluble alkyd resin polyesterification condensation reaction product of polyhydric alcohol and polycarboxylic acid, having an acid number between about 6 and about 25, dispersed in an aqueous lithium hydroxide solution, said paint containing, based on resin and solution blended together, between about 5 and 40 weight percent of said resin, lithium hydroxide in an amount between about 50% and about 100% of that theoretically needed to neutralize said resin.

Novel Fatty Acid Varnishes

U. S. Patent 2,984,633. Frank J. Hahn, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo., a Corp. of Dela.

An air drying ester formed from reactants consisting solely of one molar proportion of an essentially linear polymer containing hydroxyl groups and at least 1.5 molar proportions of unsaturated monobasic fatty acids containing at least 12 carbon atoms and having an iodine number of at least 85, said polymer having a molecular weight of 700-10,000, a hydroxyl content of 4-15 weight percent and containing an average of at least 3.0 hydroxyl groups per polymer chain, said polymer having been prepared by subjecting a binary interpolymer of at least 60 weight percent of an alpha,beta ethylenically unsaturated aromatic hydrocarbon and not more than 40 weight percent of an alpha, beta ethylenically unsaturated aldehyde to reducing conditions of sufficient severity to reduce substantially all of the carbonyl groups of the interpolymer to hydroxyl groups, the alpha, beta ethylenically unsaturated aromatic hydrocarbon included in said polymer being selected from the group consisting of styrene, alpha-alkyl styrenes, ring-substituted alkyl styrenes, alpha-alkyl ring substituted alkyl styrenes and mixtures thereof, the alkyl groups in said alkyl-substituted styrenes containing up to 2 carbon atoms and being the only substituent group present therein, the alpha,beta ethylenically unsaturated aldehyde included in said polymer being selected from the group consisting of acrolein, methacrolein and mixtures thereof.

Vinyl Chloride Polymers Plasticized With Adducts of Alkyl Fumarates and Mesityl Oxide

U. S. Patent 2,984,637. Joachim Dazzi, Dayton, Ohio, assignor to Monsanto Chemical Co., St. Louis, Mo., a Corp. of Dela.

A resinous composition comprising a resinous polymer selected from the class consisting of homo-polymers of vinyl chloride and copolymers of vinyl chloride with mono-ethylenic unsaturated monomers, said copolymers containing at least 70% by weight of vinyl chloride combined therein, and said resinous polymer being plasticized with an adduct in which one mole of mesityl oxide is chemically combined with one mole of a dialkyl fumarate having from 1 to 8 carbon atoms in each alkyl radical, said adduct having been prepared by heating the mesityl oxide with the fumarate.

Modified Alkyd Resins

U. S. Patent 2,987,491. Alfred R. Bader, Milwaukee, Wis., and Henry A. Vogel, Richland Township, Pa., assignors to Pittsburgh Plate Glass Company.

A beta-amino crotonate of a hydroxyl-containing alkyd resin which is a phthalic glyceride modified by a glyceride oil.

Black Antifouling Paint

U. S. Patent 2,989,407. William J. Francis, Portsmouth, Va.

A marine paint comprising a vehicle and a pigment, said vehicle consisting essentially of:

	Percent
Rosin	20.23—28.86
Blown fish oil	7.97—13.26
Solvent	16.72—25.07

and said pigment comprising a mercuric oxide containing material in which the nercuric oxide is present in an amount of .88—5.27%, all percentages being of the weight of the paint.

Flameproofing of Wood

U. S. Patent 2,990,297. Charles M. Shaw, Albany, Calif., assignor to California Research Corporation, San Francisco, Calif., a corporation of Delaware.

A flameproofed article of wood, said wood being impregnated with a flameproofing amount of a composition comprising a major proportion of a wood preservative oil and at least 5% by weight of a member of the groups consisting of (1) reaction product of phosphorus pentasulfide and pinene, (2) zinc dialkyl dithiophosphate containing from 3 to 8 carbon atoms in each of the alkyl groups and zinc dialkylphenyl dithiophosphate containing from 14 to 24 carbon atoms in each of the alkylphenyl groups, and (3) combination of members of each of group (1) and group (2), said combination consisting of from 10 to 90% by weight of reaction product and from 10 to 90% by weight of zinc dithiophosphate.

Alkylol Phenol-Modified Copolymers

U. S. Patent 2,990,385. Alfred F. Schmutzler, Summit, N. J., assignor to France, Campbell & Darling, Incorporated, Kenilworth, N. J., a corporation of New Jersey.

A composition of matter comprising a major amount of a copolymer of a vinyl monomer and an unsaturated fatty acid-modified alkyd resin and a minor amount of at least a gel inhibiting quantity of an alkylol phenol selected from the class consisting of a monomeric monomethylol phenol and a monomeric dimethylol phenol and mixtures thereof.

Deodorizing Oil Modified Alkyd-Vinyl

U. S. Patent 2,990,384. Alfred F. Schmutzler, Summit, N. J., assignor to France, Campbell & Darling, Incorporated, Kenilworth, N. J., a corporation of New Jersey.

The process of improving the ordor of an inert solvent solution of a previously formed copolymer of a vinyl compound and an unsaturated fatty acid-modified alkyd resin comprising adding to said solution of said copolymer a deodorizing amount of an unsaturated aliphatic carboxylic compound, said compound being a member selected from the group consisting of unsaturated aliphatic carboxylic acids, anhydrides of unsaturated aliphatic dicarboxylic acids, imides of unsaturated aliphatic dicarboxylic acids, said alkyl esters of unsaturated aliphatic polycarboxylic acids, ammonium salts of unsaturated aliphatic carboxylic acids, amides of unsaturated aliphatic carboxylic acids, amides of unsaturated aliphatic carboxylic acids, and amine salts of unsaturated aliphatic carboxylic acids, and heating said mixture until the vinyl polymerization odor is substantially lessened.

Liquid Coating Composition

U. S. Patent 2,990,386. Charles F. Roney, Hammond, Ind., assignor to Bee Chemical Company, Chicago, Ill., a corporation of Illinois.

A liquid coating composition for direct application to a surface as a protective and decorative coating which comprises discrete particles of a liquid coating component suspended in a liquid consisting essentially of nitromethane containing a nitromethane soluble protective colloid stabilizing agent, said liquid coating component comprising an organic liquid containing pigments, said organic liquid of the coating component being immiscible with the nitromethane, the majority of the discrete particles of the liquid coating component being larger than 50 microns in size and said suspended discrete particles remaining in suspension without appreciable coalescence upon shaking after standing for a substantial length of time.

Put the hiding power where it belongs...

And it *belongs* in flat paints—where effective coverage is an indispensable quality. To achieve it, experienced paint formulators rely on a happy combination of the right vehicle and the right TITANOX white pigments.

For organic solvent flats, TITANOX-RCHT (30% TiO_2) and TITANOX C-50 (50% TiO_2)—both carrying their own extender—give highest hiding at lowest cost. For emulsion flats, easy dispersing, high-hiding TITANOX-RA-50 rutile "pure" titanium dioxide is preferred.

Like all TITANOX pigments, these products have the uniformity of all properties and easy working qualities that help keep paint production men out of difficulty. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal.

TITANIUM PIGMENT CORPORATION
SUBSIDIARY OF NATIONAL LEAD COMPANY

TITANOX

8001

TECHNICAL Bulletins

CLOSER AND FEEDER

Four page bulletin describes full line of extended can end feeds for seamer-closers and liners. Models of specially developed closer and liner feeds to handle full range of ends from 202 thru 609 diameters.

Trans-Mation Systems, Dept. PVP, 4909 E. Florence Ave., Bell, Calif.

PAINT STRIPPERS

Bulletin 8-16 covers a number of quick acting, safe and easy to use protective-coating stripping formulation suggestions. The formulations have proven effective for stripping most types of organic coatings from various metals. These include phenolics, epoxies, urea and melamine formaldehyde, varnishes and coatings based on drying oils. Five ideas for formulations based on various Armour chemicals are presented.

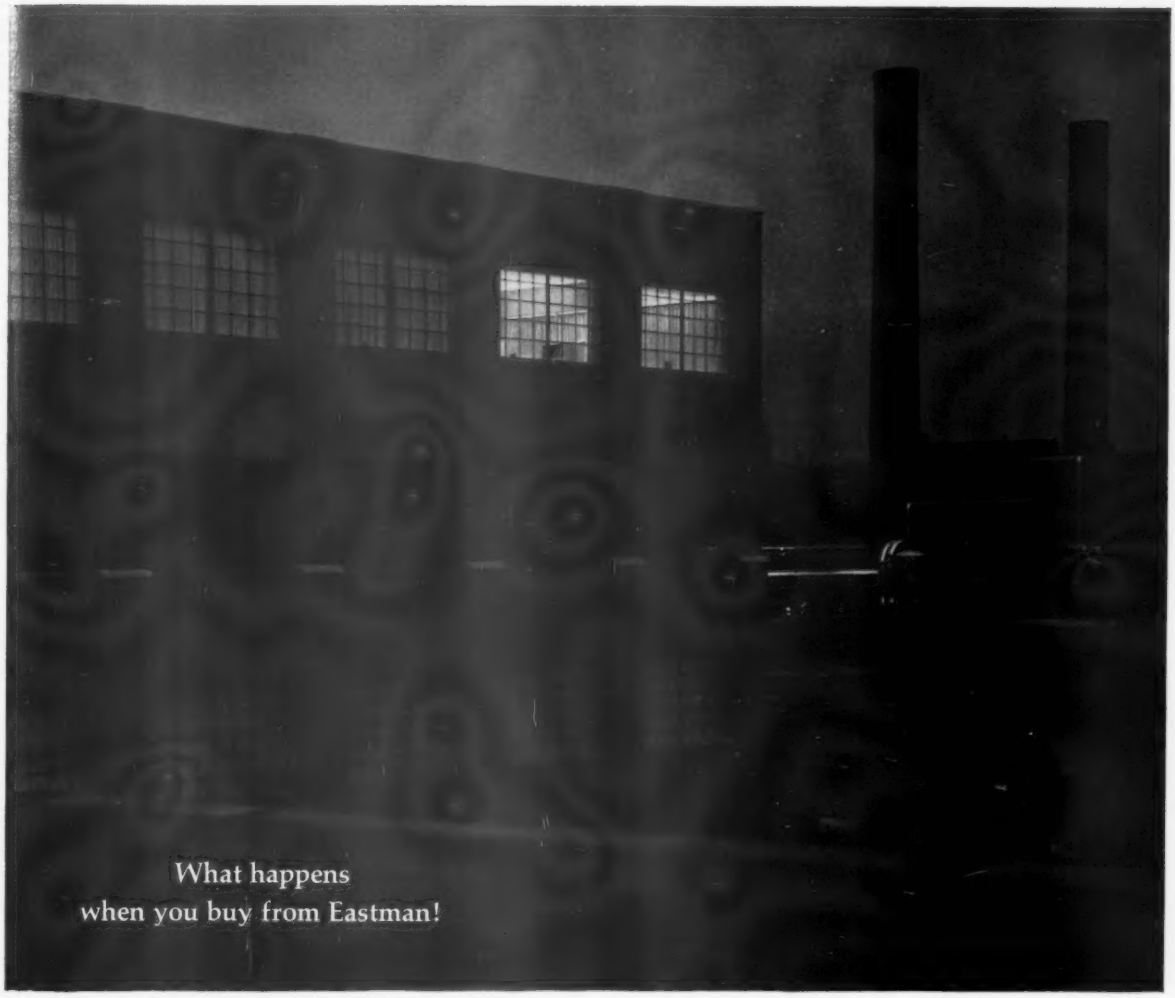
Armour Industrial Chemical Co., Dept. PVP, 110 N. Wacker Drive, Chicago, Ill.

AIRCO CHEMICALS

Two abbreviated versions of the Airco bulletin, covering the product lines of two of the company's chemical marketing departments are available. A six-page bulletin entitled "Colton Polymers" lists the physical properties and applications of the products marketed by the Colton polymers department. Among the products included in the bulletin are Airco "Vinol" polyvinyl alcohols, "Flexbond" copolymers, "Vinac" polyvinyl acetates, "Flexac" polyvinyl acetates, and "Aircoflex" dibutyl phthalate.

"Airco Organic Chemicals" is a four-page bulletin covering Airco vinyl monomers, acetylenic alcohols and glycols, alkyl acetylenes, and "Surfynol" surface active agents. These products are marketed by the organic chemicals department.

Air Reduction Chemical & Carbide Co., Dept. PVP 150 E. 42nd St., New York 17, N. Y.



Repeat performance

One of our regional sales managers relates the following:

"It was one of those ten of five Friday afternoon phone calls, so you might say I answered... well, guardedly.

"But it turned out to be a customer calling to say thanks for a service we had performed on the previous weekend. His acetone recovery unit had gone "sour," and he had called at about the same time a week past to ask if there was any possible way we could deliver 4,000 gallons of acetone before 8 o'clock Monday morning.

"To make a long story short, we did deliver. Of course it involved extra-schedule crews to clean and load a tank truck on Saturday morning, not to mention late Friday hours for some of the people in our order writing and traffic departments. But, as the customer pointed out while extolling our service at length and my part in it, our extra effort sure saved the day for them by keeping their process going.

"I was just beginning to get a smug, self-satisfied feeling when the customer said: 'Bob, you're not going to believe this, but....'

"He didn't have to say another word. The only thing that worried me was what to say to our production people after repeating to them: You're not going to believe this, but....

"Well all I *could* say was: Can you do it again? And they did. Same customer, same place, before 8 o'clock on Monday morning."

We sincerely hope that this *lightning-strikes-in-the-same-place-twice* situation never happens in your process operations.

But if it does, and you need service fast, give us a call.

Eastman CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE. Subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, North Carolina; Houston; Kansas City, Missouri; New York City; Philadelphia; St. Louis.
Western Sales Representative: Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Salt Lake City; Seattle.

properties listed for all products.

Dover Chemical Corp., Dept. PVP, W. 15th St., Dover, Ohio.

TESTING EQUIPMENT

28-page bulletin lists company's optical as well as physical test instruments covering complete descriptions and prices.

Gardener Laboratory, Inc., P.O. Box 5728, Bethesda, Md.

MATERIALS HANDLING

20-page condensed catalog (Bulletin SP 4070) covering the complete line of Clark fork trucks, powered hand trucks, straddle carriers, towing tractors, attachments and container handling equipment.

Clark Equipment Company, Industrial Truck Div., Dept. PVP Battle Creek, Mich.

PRODUCT REFERENCE

12-page booklet describing the physical properties and suggested uses of the firm's full product line.

The new Product Reference File, which is an expansion of a shorter work, presents data on "Formvar," polyvinyl formal, "Butvar," polyvinyl butyral, "Gelvatol," polyvinyl alcohol, and "Gelva," polyvinyl acetate, resins, emulsions and spray-dried powders.

Shawinigan Resins Corporation, Dept. PVP, Springfield 1, Mass.

REDUCE SHIPPING COSTS

Fully 35 specific ways to reduce the big bite taken by transportation costs out of the sales dollar are digested in a new booklet entitled "35 Ways To Reduce Your Shipping Costs".

Institute For Business Research, Inc., Dept. PVP 49 West 57th Street, New York 19, N. Y. Price $1.00.

N-BUTYL ALCOHOL

A revised and expanded data bulletin on n-butyl alcohol contains U.S.I. specifications for n-butyl alcohol in addition to resin solubilities, chemical references. A large section on physical properties is included, as well as an extensive list of binary and ternary azeotropes.

This bulletin is specifically designed to provide information on n-butyl alcohol for the surface coatings and chemical processing industries.

U. S. Industrial Chemicals Co., Dept. PVP 99 Park Avenue, New York 17, N. Y.

PORTABLE MIXERS

Of particular value to the process engineer who is responsible for choosing gear or direct driven portable mixers (which are driven by either electric motor or gas or air power) is a detailed description of the factors involved in mixer selection. This material, along with a mixer selection table, will enable anyone to pick the correct mixer for his job from among the 10 basic models, in horsepowers ranging from ¼ to 3 H.P.

The Cleveland Mixer Co., Dept. PVP P.O. Box 197, Bedford, Ohio.

PLASTICIZERS

Data Sheet No. 560 describes Pfizer's line of "Morflex" plasticizers covering tentative specifications, physical properties, performance, and uses.

Chas. Pfizer & Co., Dept. PVP, 235 E. 42nd St., New York 17, N. Y.

CROSSLINKING LATEX

Technical brochure describes the recently introduced self-reacting crosslinking resin latex, X-Link 2833. Brochure gives prospective users information and data on properties, formulation, and applications of this vinyl-acrylic copolymer dispersion, which is capable of cross-linking without the addition of thermosetting resins.

Properties of this copolymer in film strength and resistance to water, creep, and solvent which offer application advantages over those of conventional thermoplastic resins are described, and formulation data on pigmentation and thickeners are given.

National Starch and Chemical Corp. Dept., PVP, 750 Third Ave., New York 17. N, Y.

ALCOHOLS

80-page booklet contains comprehensive data on twenty-one alcohols, from methanol to tridecanol. Included is information on physical properties; constant-boiling mixtures; specification limits; test methods; storage, handling, and shipping; toxicological properties; and selected literature references.

Special sections of the booklet describe ethanol in proprietary solvents, alcohols for performances of alcohols in coatings, and performances of plasticizers. The section of coatings includes resin solubilities, relative evaporation rates and dilution ratios, and similar coatings formulation data.

Union Carbide Chemicals Co., Div. of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

RESINS FOR PAINT

The guide outlines why an investment in hydrocarbon resins can yield increased profitability for paint producers. Included in this handy folder is pertinent information concerning the excellent compatibility of firm's resins in specialized formulations such as those for multicolor, metallic pigmented paints and others.

Velsicol Chemical Corporation, Dept. PVP 330 East Grand Avenue, Chicago 11, Illinois.

FLOOR FINISH TESTS

Revised specification covering finishes for floors of Northern Hard Maple have been issued. These new specifications become official Sept. 1, 1961 and supersede those published in 1958. They establish standards for finishes for both heavy duty and gymnasium floors and are designed to give users of these products the benefit of new developments and improvements since the 1958 specifications.

Maple Flooring Manufacturers Assoc., Dept. PVP, 35 Wacker Drive, Chicago 1, Ill.

DRY HOMOGENIZATION

Bulletin illustrates the dry homogenization efficiency of centrifugal mixers for blending pigments into thermoplastic powders, cement paint ingredients, and for pigment coating of polystyrene pellets.

Entoleter Inc., Dept. PVP, P.O. Box 904, New Haven 4, Conn.

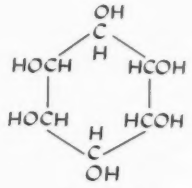
CHLORINATED PARAFFINS

Bulletin describes all available chlorinated paraffins for use in paint and plastics applications, including various water dispersed systems, with complete physical

ALKYDS—POLYHYDRIC ALCOHOLS

(*From page 46*)

Inositol is a hexahydric alcohol occurring in corn steep liquors. Its formula may be indicated as follows:



Inositol

Utility of inositol in the protective coatings industry has been explored by Gibbons and Gordon [*Industrial and Engineering Chemistry*, **42,** 1591 (1950)] and by Burns [British Patent 408,597, April 6 (1934)].

The concept of incorporating resinous character into a polyhydric alcohol is well exemplified by the epoxy resins. The higher molecular weight members of this series of materials contain hydroxyl groups along a chain comprised of phenyl ether groups.

Another resinous polyhydric alcohol introduced recently to the protective coatings industry is presumably a copolymer of styrene and allyl alcohol. Thus, the recurring unit in the polymer consists of four carbon atoms with a phenyl group on the first carbon atom and a hydroxymethyl group on the third. All of the hydroxyl groups are primary and there are five to six such hydroxyl groups per molecule. Chemically, the material may be characterized as poly(1-phenyl,3-hydroxymethyl butene). One of the proposed uses for this resinous alcohol is actually in alkyd resin manufacture. The product is said to be quite stable to normal cooking temperatures and to esterify rapidly to low acid numbers, as might be expected from the presence of the primary hydroxy groups. It has very good color and this carries over into the alkyd resins formulated from it.

Allyl alcohol may be polymerized by itself to obtain a polyallyl alcohol which can be used in protective coatings and alkyd formulations. This product, however, is not believed to perform as well as the styrene allyl alcohol copolymer just described.

The use of polyallyl alcohol in alkyd resin formulation has been described by Pfann and Kropa in U. S. Patent 2,609,358 (September 2, 1952).

As the last few pages indicate, many millions of dollars of research money have been expended in the search for new polyhydric alcohols which might be used effectively as building blocks for alkyds. As our technology becomes more advanced, it may be expected that work of this nature will continue. Whereas the bulk of the new products proposed for use by the protective coatings industry will not find a home, we can undoubtedly expect that there will be one or two or more which will expand the vistas of the alkyd resin industry sufficiently to be adopted and to become a standard item in the alkyd formulators "bag of tricks".

New Books

Organic Coating Technology Volume II. Pigments and Pigmented Coatings

Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 724 pages. Price $17.50.

This book is intended to be used with *Oils, Resins, Varnishes, and Polymers,* Volume I of Payne's Organic Coating Technology, to provide the student and new technical man in the paint and raw material industries with a concise but comprehensive manual of the chemistry, manufacture, and applications for the raw materials and finished products of the paint industry.

The single authorship of these two volumes has helped to maintain throughout both books a consistent tone without repetition and a balance between basic concepts and the practical aspects or technology of the subject.

It should not be supposed that, as the title of these two volumes might suggest, only technology of coatings is discussed in detail. Sufficient discussion of basic theory is included to provide a working knowledge of the physics and chemistry of pigments and coatings. In this volume, for example, the phenomenon of color and its measurement is discussed together with the relation of hiding power of pigments to their physico-chemical characteristics. Also, the author has included a basic discussion of surface active agents because of their importance in the newer developments in water paints.

Polyolefin Resin Processes, *by Marshall Sittig*

Published by Gulf Publishing Co., Book Div., May, 1961, 240 pages. Price $6.50.

This book provides a comprehensive review of U. S. patents in the polyolefin resin process field. The reader will find all U. S. polyolefin patents listed in order of application. This listing contains patent application serial number, date, U. S. patent number and book reference number.

The book covers solid (rather than liquid or viscous) polymers and concentrates on resins, homopolymers of aliphatic monolefins and some copolymers of olefins with other olefinic hydrocarbons.

It also covers the process starting with olefin raw material and concluding with a purified polymer. Thus it includes catalyst and solvent recovery with attendant steps between olefin and polyolefin. Admixture of aluminum alkyls with other compounds to produce the actual complex metal catalysts are considered.

Here's the proven producer in the aerosol valve field. You can use Newman-Green valves to help your paint sales grow faster and bloom into bigger profits. And, you benefit at the factory as well as the counter. Newman-Green valves pressure-fill faster, operate more dependably, give even spray patterns with all types of paints.

Spray tips are interchangeable in seconds. Exacting step-by-step quality control manufacturing guarantees you trouble-free filling operations and eliminates the necessity of your own line testing.

Call your nearby Newman-Green representative with your order today.

NEWMAN · GREEN, INC. *Creative Aerosol Valve Engineering*

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MAdison 6-9980

EASTERN DISTRICT
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New York 17, New York
MUrray Hill 7-7147

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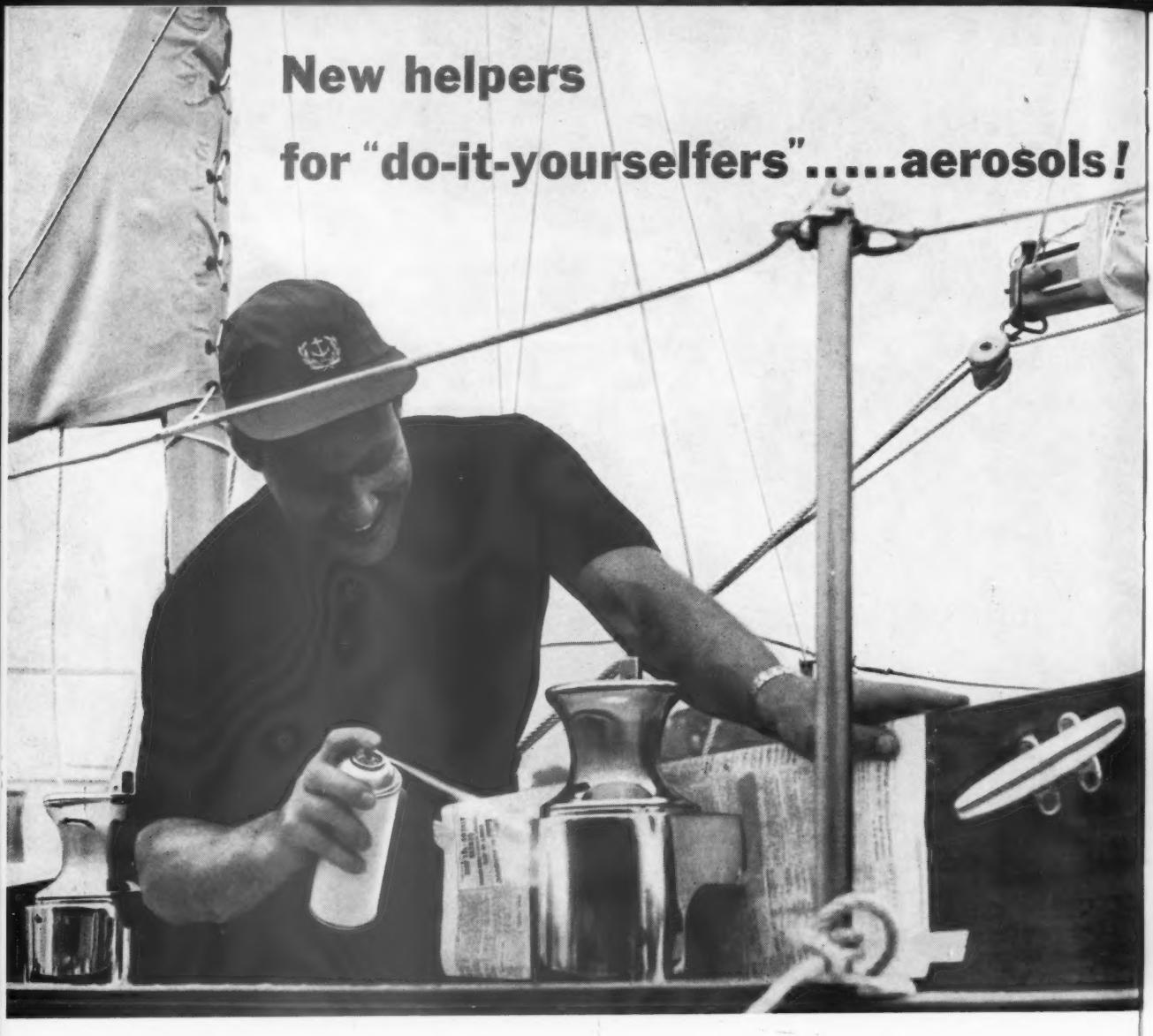
57 Interstate Avenue
Addison, Illinois
KIngswood 3-6500

AEROSOL COATINGS

PACKAGING

FORMULATION

PRODUCTION



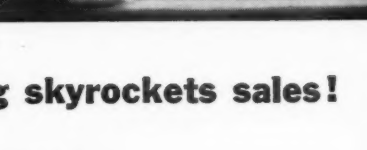
New helpers for "do-it-yourselfers".....aerosols!

How the magic touch of aerosol packaging skyrockets sales!

Today, such handy "do-it-yourself" aerosol products as paints, protective coatings, stains, fillers, car polishes, waterproofing sprays and many others are making jobs easier, quicker and neater. Tomorrow, who knows what *new* aerosol products will capture the fancy of consumers in this important market?

If you have a product—*any* product—with "aerosol potential" why not call on General Chemical? As one of America's leading producers of aerosol propellants, General Chemical offers many helpful services to prospective aerosol marketers. For example, we can supply you with valuable technical data and the latest market information. We can show you promising aerosol formulations developed in our laboratories. And we can put you in touch with experienced contract fillers, capable of putting up small test runs for you or handling full-scale commercial production.

For further information—or if you would like to arrange for a special presentation—write or phone us today.



Aerosol paint and protective coating sales, for example, have climbed 58.7%* in just 3 years!

*Estimated by Market Surveys Department, General Chemical Division, Allied Chemical Corporation.

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

genetron®
aerosol propellants

Putting the "push" in America's finest aerosols

DIVERSIFICATION AND STANDARDIZATION HELP GROWTH OF AEROSOL PAINTS

NEW products, riding the sudden upsurge in aerosol paint markets, new know-how, new customer demands usher in the 1960's rash of specialty paint formulations reaching the American market. The last two years alone have seen the following new entries:

Aerosol paints use on vinyl plastics and fabrics, such as automobile interiors were introduced by Plasticote, Inc. Nu-Color of America introduced its line of pressurized paints for use on fabrics—rugs, canvas, tops of convertibles, upholstered chairs, etc. An aerosol rust inhibitor paint was brought out by Benjamin Moore.

New fast-drying vinyl alkyd sprays were introduced by Seymour Company. Plasticote has brought out a new line of aerosol touch-up colors for automobile finishes as well as pressurized hammer finishes for use in repainting dashboards of used cars, tool boxes and similar metal surfaces. Martin-Senour has reported good initial success with its recently introduced acrylic coatings and tractor enamel colors in pressurized containers.

Particularly good growth is expected from the introduction of multicolor and fluorescent pressure paints. Both are new products on the market and a number of paint formulators are preparing their own product lines for this promising field.

What is believed to be the first successful pressure package for multi-color paints was introduced in 1959 by Benjamin Moore under the trade-name "Mor-Flek Spray Finish." The product is a true multi-color paint; i.e., it is not pre-mixed but three or four colors are sprayed from the can simultaneously.

"Mor-Flek" is a rubberized vinyl coating, characterized by the formation of a hard, tough, elastic, and well washable film. It is primarily intended for coating of indoor furniture: wood and metal cabinets, lamps, tables, bookshelves, waste baskets, etc. Because of the promising market, several other producers have indicated their intention of entering the multi-color aerosol paint field, among them: Martin-Senour, and Plasti-Kote.

—Head Fluorescent paints—

Introduction of fluorescent paints in aerosol form has had to overcome a number of technical problems. These surface coatings find their primary market in safety markings, stencil warnings, and sign painting. More recently, they have been utilized with good success in anti-collision markings for aircraft and numerous other safety applications.

Fluorescent paints, as such, have long been used in silk screen printing, but early formulations in aerosol packages were troubled by valve difficulties and pigment settling. Both of these problems could be resolved by improved valve design and by use of finer pigment particles. Today's fluorescent aerosol paints contain pigments with average particle size of 3.5 microns, compared with an average of eight microns a few years ago. Even more important for easy valve operation, maximum particle size has been reduced from 100 to 30 microns.

A second, important marketing problem has been the instability of many fluorescent pigments when exposed to sunlight. Since the bulk of aerosol paints is applied by amateurs, pressure formulations must be particularly foolproof. There is a tendency on the part of the amateur painter to apply too thin a coat of fluorescent formulations because of the initial brilliant appearance of the coating. The customers became dissatisfied when this coat faded after only short exposure to sunlight.

Customer education to use thicker coats of fluorescent paint has not

provided the entire answer. More important, improvements have been made in the available fluorescent pigments, and fading is today a greatly reduced problem. Not all colors have become available in highly weather-resistant form, but a good selection exists. Harmon and Volidsch of Lawter Chemicals, Inc., show the relative detectability and weather-resistance of today's fluorescent pigments in comparison with non-fluorescent white (See Table I).

It will be noted that, among the pigments tested, best detectability (yellow-orange and red-orange) is associated with good weathering while the best weather stability is shown by cerise, red, and 22 red, pigments of only medium detectability. The user of aerosol fluorescent paints must therefore often make a compromise between brilliance and weatherability.

Pigment	Weathering Characteristics	Detectability Index
White (standard)	———	33
Yellow-orange	good	130
Red-orange	"	112
Cerise	excellent	80
Red	"	77
22 Red (pink)	"	73
Gold yellow	fair	96
Lemon yellow	"	80
Green	"	45

Table I

As for physical properties of today's aerosol-grade fluorescent pigments (which are organic dyestuffs), Harmon and Voldisch report a typical softening point of 145-155°C., an average particle size of 3.2-3.5 micron and a bulk density of 11.3 pounds per gallon. These pigments are insoluble in water and in most hydrocarbons, but are soluble in ketones and esters. Acrylic resins are reported to be the best carriers for this particular aerosol application because of their high transparency, good light and ageing stability and solubility in aromatic hydrocarbons which are the preferred let-down solvent for fluorescent aerosol paints.

The lower chloro-fluoro hydrocarbons are suitable as propellents for fluorescent paints. A fast-drying solvent is called for, and the usual choice is toluene or isopropanol. Some higher-boiling solvent is added to prevent nozzle drying.

Acrylic and Vinyl Types

An interesting trend of the last 2-3 years has been the growing adoption of acrylates, vinyls and vinyl-alkyd resins in aerosol paint formulations. At present, however, the principal base in such coatings are alkyds and nitrocellulose resins with some trend toward combinations of these into a single package.

The reason for the fairly limited range of resins in aerosol products, when compared with the broad scope of standard surface coating formulations, is again the need to formulate for the "do-it-yourself market, i.e., for inexperienced consumers. The formulation must be fast-drying to avoid running on vertical surfaces. Still, enough slow-drying solvent must be included to permit formation of a smooth surface, i.e. to allow afterflow of the coating.

In aerosol surface coatings, alkyds are the most widely used resin base for varnishes. These

esins are oxidized most readily and form a film of high durability and luster, as well as of good flow. Because of their slower oxidation rate, present eopxy and polyester resins are not suitable for aerosol formulations, although they are popular in non-pressurized packages.

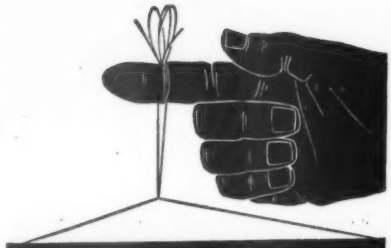
In the field of lacquer and enamels, nitrocellulose definitely holds number one position for aerosol use. They can be formulated into finishes which will dry in a few minutes. The resulting finish is tough, hard, durable, exhibits good washability and color retention.

Ludwig Hecht of Lenmar Lacquer feels that even better outlook is offered in aerosols for nitrocellulose-alkyd coatings. Here, the advantages of nitrocellulose are joined by the high gloss, firm build-up and better adhesion provided by alkyds. These compositions are somewhat higher in raw materials costs than pure alkyds.

The future of aerosol paints, both standard and specialty, is expected to benefit also from better understanding of customer needs in the package. Freedom from clogging is essential, and depends partly on formulating around the propellent which makes up some 35-50% of the package, partly on valve design.

There is growing recognition that the maximum standard size of the aerosol can must be 16 ounces. Larger sizes are claimed to be too tiring to the inexperienced user. There is little enthusiasm in the industry for 24-ounce or 32-ounce cans which are believed to create no new sales and will complicate the inventory problem.

Some present developments may lead to eventual wider adoption of aluminum cans for aerosol paints. The main advantage of reduced weight can offset in many markets the greater cost. The second big advantage of aluminum, freedom from corrosion, looms less significantly as formulators have learned to exclude moisture from propellents and other ingredients of the paint formula. This elimination of moisture has benefited aerosol coatings further by reducing troubles due to thickening of the paint and precipitation of pigment and resin.



CALENDAR

Aug. 28-29. 41st Annual Convention of American Soybean Assn., Claypool Hotel, Indianapolis, Ind.

Sept. 3-8. 140th National Meeting, American Chemical Society, Chicago, Ill.

Sept. 11-15. Fall Instrument-Automation Conference and Exhibit and 16th Annual Meeting, Instrument Society of America, Memorial Sports Arena, Los Angeles, Calif.

Sept. 17-20. 49th Annual Convention of Canadian Paint, Varnish & Lacquer Assn., Park Plaza Hotel, Toronto, Canada.

Oct. 18-20. 23rd Annual National Packaging Forum of the Packaging Institute, Biltmore Hotel, New York City.

Oct. 30-Nov. 1. Seventy-fourth Annual Meeting of the National Paint, Varnish and Lacquer Assn. Statler-Hilton Hotel, Washington, D. C.

Oct. 30-Nov. 1. Fall Meeting of the American Oil Chemists Society, Pick-Congress Hotel, Chicago, Ill.

Oct. 30-Nov. 1. 4th Annual Meeting and Conference of the Canadian Mfrs. Specialties Assn., Royal York Hotel, Toronto, Canada.

Nov. 2-4. Annual Convention of the Federation of Societies for Paint Technology. The Shoreham and Sheraton-Park Hotels, Washington, D. C.

November 26-28. Fourteenth Annual Convention and Trade Show of the Retail Paint & Wallpaper Distributors of America at Cobo Hall, Detroit, Mich.

December 4-6. Chemical Specialties Mfrs. Assn., 48th Annual Meeting, New York City.

Aerosol Developments

Crown Announces Improved Aerosol Can Coating

A significant development in aerosol cans which provides an internal coating system far superior to those used in other fabricated aerosols has been announced by Crown Cork & Seal Co., Inc. Known as Crown Spra-Clad 16 oz. aerosol can, the new product has an internal coating system similar to that of Crown's Spra-Tainer. In addition to coating in the flat prior to fabrication, the new product is coated internally after the body has been formed in the round. This new method eliminates interior coating scratches that might otherwise occur in the can body fabricating process.

With today's emphasis on hard to hold products (shaving cream, starch, window cleaners, etc.) an effective internal coating system was a necessity.

Crown has tooled and equipped new lines to handle large volume orders for the new Spra-Clad 16 oz. aerosol can. Cans are available with various interior coatings designed for compatability with the product to be dispensed.

With the availability of its new Spra-Clad 16 oz. can for the growing market of water base products and other aerosol products which are otherwise difficult to hold, Crown anticipates a substantial increase in their aerosol can production.

Pennsalt Names Willson and Reed To New Isotron Technical Service Posts

Pennsalt Chemicals Corp. has announced the appointment of Richard C. Willson, Jr. as technical service manager for Isotron products. At the same time, Allen B. Reed, Jr. was named supervisor of the Isotron Aerosol laboratory.

In his newly created position, Willson will be responsible for all aspects of technical service on Pennsalt's line of Isotron refrigerants, aerosol propellants and foam blowing agents. Included under his supervision will be Isotron Engineering Services and the Isotron Technical Service Laboratories.

Reed will supervise the Isotron Aerosol Laboratory which provides Pennsalt's customers with technical service on special and modified formulations, packaging techniques, and storage life studies.

Willson was graduated from Johns Hopkins University in 1952. Since joining Pennsalt he has held various technical service positions in the Industrial Chemicals Division and the Isotron Department.

Reed received his degree in chemistry at Cornell University. Prior to joining Pennsalt's Technical Division as a development chemist, he was connected with the paint and technical laboratory at the army's Aberdeen Proving Ground in Md.

Both Willson and Reed have been associated with Pennsalt's Isotron Department since it was formed in 1956. They will make their headquarters at the company's new Technical Service Center at King of Prussia, Pa.

New "Genetron" Plant Begins Production In New Jersey

Allied Chemical's General Chemical Division recently announced production of "Genetron" fluorinated hydrocarbon refrigerants and aerosol propellants from a new multi-million dollar plant in Elizabeth, N. J.

With a capacity well in excess of 10,000 tons per year, this plant marks General Chemical's third "Genetron" producing facility. It will supply customer requirements throughout the Northeast.

Initial products now in full production at Elizabeth are the 3 primary refrigerants and aerosol propellants: "Genetron" 12 (dichlorodifluoromethane), "Genetron" 11 (trichloromonofluoromethane) and "Genetron" 22 (monochlorodifluoromethane).

These fluorinated hydrocarbons are used as refrigerants in virtually all modern household, commercial and industrial air conditioning and refrigeration equipment. "Genetrons" 12 and 11 are also employed as propellants for millions of non-food aerosols each year. Still newer uses for "Genetron" 11 are as a blowing agent for urethane foams, and as a solvent.

General Chemical formerly supplied Northeastern customers with these products as well as with "Genetron" 114 from bulk storage facilities at Elizabeth, which in turn, were stocked with "Genetrons" produced at Baton Rouge. "Genetron" 114 will continue to be supplied in this way as will mixtures of "Genetrons" 114 and 12.

The entire "Genetron" line includes some twenty organic fluorine compounds with a broad range of physical and chemical properties. General Chemical is the nation's largest producer of hydrofluoric acid, elemental fluorine, and more than 100 organic and inorganic fluorine chemicals which are made from them.

European Aerosol Association To Hold Annual Meeting

The Federation of European Aerosol Associations (F. E. A.) will hold its third annual meeting on October 3 through 8, in Lucerne, Switzerland. At the same time, meetings of the International Aerosol Association, will take place along with an exhibition of aerosol products and a package contest restricted to packages of F. E. A. members. Persons desiring more information should write to Mr. A. W. Naegle, Federation of European Aerosol Associations, Waisenhausstrasse 2, Zurich 1, Switzerland.

The scheduled lectures include the following: Thursday, October 5, G. M. Mayer of Zurich will speak on "Aerosol Containers, Raw Material, Manufacturing, Equipment." At the same time, Dr. K. Jacobi, Director, J. A. Schmalbach, Braunschweig, will lecture on "The relation between the Aerosol practice and the Aerosol packagings regulations." Dr. B. Medlundh, Technical Director, Skandinaviska Aerosol AB, Stockholm, will deliver the sixth lecture on "Weighing Problems in Aerosol Filling."

On Friday, October 6, Dr. W. Roth, J. R. Geigy AG, Basel/Milano, will present a talk entitled, "An Examination of the inflammability of Aerosols". Some other lecture titles include, "The Formulation of Aerosol Paints and Lacquers", "Problems of Varnish and printing Colors for Aerosol Containers", and "Conversations and Discussions on Aerosol Questions of a general interest."

NEWS

Industry Dinner Honors Kohnstamm

Leaders in the paint and chemical industries and friends gathered at the Hotel Delmonico on June 28, to honor Paul L. Kohnstamm, president of H. Kohnstamm & Co., Inc., on behalf of Joint Defense Appeal.

The dinner was a major event in the paint and chemical industry's annual drive for funds to support the human relations program of JDA's affiliated agencies.

Open New Mexican Chemical Plant

Interchemical de Mexico, S.A., a subsidiary of Interchemical Corp., recently opened a plant in the Mexico City suburb of San Pedro Xalostoc.

The new plant has 40,000 sq. feet of work space and is staffed by Mexican personnel.

French Plant Goes On Stream

United Carbon Co. has begun commercial production at its new carbon black plant in Port Jerome, France.

The new $5 million plant will produce 50 million pounds of furnace black per year.

Cemco Head Announces New Offices

Cemco, Inc., manufacturers and sellers of resins and chemicals used in paint products, have recently established headquarters at 50 E. 41st St., New York City.


H. T. Von Oehsen

The announcement was made by Howard T. Von Oehsen, president of the firm which was formed in 1960. Mr. Von Oehsen was formerly associated with General Mills and Heyden Newport Chemical Corp.

Surface Technology Lab at NYU

The Graduate Division of the NYU College of Engineering will include in its 1961-1962 curriculum, a surface technology laboratory.

The course, taught by Dr. Max Kronstein, will meet on Monday evenings from 7 until 9, in the University Heights Center.

Amoco Buys Interest in Japanese Firm

Amoco Chemicals Corp. has purchased a substantial minority interest in Furukawa Chemical Industries, Ltd., Tokyo, Japan.

The Japanese firm manufactures a number of products such as high density polyethylene and copolymers.

Marbon Names Texas Distributor

The appointment of Quentin Nelson & Co. as distributor for Marbon 9200 and 1100 MV paint resins has been announced by Marbon Chemical Division, Borg-Warner Corp. The Nelson organization will represent Marbon throughout Texas.

Allied Chemical Increases Urethane Marketing

Allied Chemical's National Aniline Division has announced completion of a new 20 million pound-per-year Actol polyether plant at Baton Rouge, La.

The new plant is part of the Company's investment in urethane research and plant facilities which will soon exceed $28 million.

NEWS

Huber Lab Planned For September

J. M. Huber Corp's. Chemicals Div. will complete a new research laboratory and administration building at Havre de Grace, Md., in September. The new structures will augment plant facilities devoted to the manufacture of chemicals and synthetic pigments for the paint industry.

The structures will house research, technical service and product evaluation laboratories, conference rooms and libraries, and will cover an area of 32,000 square feet.

Union Carbide Plans New Phthalic Anhydride Unit

Union Carbide Chemicals Co. plans to add a unit for the production of pthalic anhydride to its plant at Institute, W. Va., according to a recent announcement. The new unit will employ the fluid-bed process and will have a capacity of 50 million pounds per year. It is expected to be in full operation by the latter part of 1962.

United Carbon Awards Research Center Contract

A contract for construction of a new $2 million research center for United Carbon Co., to be built outside of Houston, Tex., has been awarded to W. R. Grimshaw Construction Co. of Houston.

The new center will house research and development work in the carbon black, synthetic rubber, polymer and petrochemical fields.

California Chemical Plans New English Plant

California Chemical Co., a subsidiary of the Standard Oil Co. of California, has announced plans for the construction of a new chemical plant at Hull, England.

The new plant will produce 35 million pounds per year of pthalic anhydride, an important ingredient in the manufacture of plastics and synthetic paints.

Artist's conception of new, 32,000 square foot Huber Corp. Research Lab. at Havre de Grace, Md. The building will be completed in September.

NEWS

Pacific Vegetable Oil Leases Processing Plant

Pacific Vegetable Oil Corp. disclosed today that it had leased (for 25 years with an option to buy) the Spencer-Kellogg vegetable oil processing plant in Long Beach, California.

The announcement was made by Mr. B. T. Rocca, Jr., president of the international trading and commodity processing firm.

Continental To Move To New Building

Continental Can Company will consolidate its head office staff and its New York City offices in a new building at 633 Third Ave., in late August and early September of this year.

Certain of the Company's division offices from outside of New York will also relocate in the new 41-story structure.

Annual Spring Meeting In Canada

Executives and personnel of Mt. Royal Colour and Varnish Co., Ltd., served as hosts when Spectromatic Assoc., Inc., held its annual spring meeting in Canada for the first time.

The group, comprised of paint manufacturers from the U. S. and Canada, held a 3 day meeting during which they completed plans for 1962 promotions.

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PERSONNEL CHANGES

AMOCO

R. B. Perkins has been appointed Manager—Sales Technical Service Laboratory.

In this newly created position, Mr. Perkins will be located in the company's general offices in Chicago.

R. B. Perkins

S. G. Wilson

CARGILL

S. Guy Wilson has been named Technical Coordinator for linseed and soybean oils in the company's vegetable oil division sales office. Mr. Wilson will supervise quality control activities, establish product specifications and act as technical liason field man between the firm and its customers.

Patrick H. Martin has been named Manager of Vehicle Research. Mr. Martin will supervise development of basic paint, varnish and lacquer components and their potential use in commercial coatings.

A. E. STALEY

Ely Balgley has been named director of the new market research department.

PITTSBURGH PLATE

Appointment of **Boyd J. Smith** as manager for the Springdale, Pa. paint factory of the firm's paint and brush division has been announced.

NATIONAL LEAD

Erich K. Zimmermann has been appointed Manager Oncor Pigment Sales at the firm's New York office. He succeeds Karel Vettewinkel who has retired after 32 years of service.

GLIDDEN

Edward Kane has been named Market Research Manager of the Paint Div.

In this capacity Mr. Kane will be responsible for organizing and directing all market research activities of the Paint Division, including sales forecasting and long-range planning.

PATTERSON-SARGENT

Appointment of **J. O. Weddle** as general trade sales manager has just been announced. Mr. Weddle will be headquartered in the Co.'s general offices in Cleveland.

J. O. Weddle

K. H. Chan

MARY CARTER

Kam H. Chan has joined the Research Center staff in Tampa, Fla., as a research chemist.

AMERICAN ZINC INSTITUTE

Louis Kettler has been appointed research engineer to the staff of American Zinc Institute Lead Industries Association Expanded Research Program.

L. Kettler

J. F. Kruysman

VULCAN-ASSOCIATED CONTAINER

John F. Kruysman has joined the sales staff as factory sales-service representative.

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